PAPERS AND PROCEEDINGS
OF
THE NATIONAL SEMINAR

ON

AGRICULTURAL GROWTH
IN THE POST REFORM PERIOD:
REGIONAL PERSPECTIVES

I
338.1
GIR

Agricultural development
Agriculture Policies

27-29 MARCH 2006



GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD; REGIONAL PERSPECTIVES

27TH-29TH March 2006

Venue:

Seminar Hall
Giri Institute Of Development Studies, Lucknow

PROGRAMME

Monday 27TH March 2006

Giri Institute of Development Studies
LIBRARY
No.....
Lucknow

10.30-11.0 **Registration**

11.00-12.0 **Inaugural Session**

Chair: Prof. Yogendra K. Alagh, Chairman GIDS

Welcome: Prof. A.K. Singh, Director GIDS

Inaugural Address: Prof. V.S.Vyas, Chairman IDS, Jaipur

Keynote Address : Prof. G.S. Bhalla, Emeritus Prof., CSRD, JNU

Chairman's Observations

Rapporteurs: Prof. Vidya Sagar, IDS, Jaipur
Dr. A. Joshi, GIDS, Lucknow

12.00-12.15 **Tea Break**

12.15-13.45 **Technical Session I : Macro View and Policy Issues**

Chair: Prof. V.S. Vyas, Chairman IDS, Jaipur

Key Speakers:

Prof. Yogendra. K. Alagh, Chairman GIDS

Prof. G.K. Chadha, Member PM's Economic Advisory Council

Dr. Ramesh Chand, Director, NCAP, New Delhi

Prof. Ravi Srivastava, CSRD, JNU

Rapporteurs: Prof. S.S. Gill, Punjabi University, Patiala
Dr. Manoj Panda, IGIDIR, Mumbai

13.45-14.30 **Lunch**

14.30-15.45 **Technical Session II: State Experiences-Maharashtra**

Chair: Prof. G.K. Chadha: Member PM's Economic Advisory Council

Agricultural Growth in Post Reform Period:
Inter-State Comparisons: Ms. Richa Singh, CSRD, JNU

Agricultural Growth in
Maharashtra : Dr. Manoj Panda, IGIDR, Mumbai

Rapporteurs: Dr. Niti Mehta, SPI, Ahmedabad
Ms. Jaya Gupta, GIDS, Lucknow

15.45-16.0 **Tea Break**

16.0-17.50 **Technical Session III: Agricultural Prices and Marketing**

Chair: Prof. G.S. Bhalla, CSRD, JNU

Agricultural Price Policy: Dr. Sudha P. Rao

Indian Farmers at Cross Roads: Dr. Surjit Singh, IDS, Jaipur

Production & Marketing of Paddy: Dr. J.P. Singh, GBPSCI, Allahabad

Rapporteur: Prof. D. M. Diwakar, GIDS, Lucknow
Shri Yogesh Bandhu, GIDS, Lucknow

Tuesday 28th March 2006

9.30-11.0 **Technical Session IV: State Experiences-Punjab and Haryana**

Chair: Prof. Sheila Bhalla, New Delhi

Agricultural Growth in Punjab: Prof. Sucha Singh Gill, Punjabi University, Patiala

Agricultural Growth in Haryana: Dr. Prem Vashisht, IHD & Mathew Philips, CENTAD, New Delhi

Rapporteurs: Prof. Surjit Singh, IDS, Jaipur
Ms. Richa Singh, CSRD, JNU, New Delhi

11.00-11.15 **Tea Break**

11.15-13.30 **Technical Session V: State Experiences-Kerala, Tamilnadu And Andhra Pradesh**

Chair: Prof. Nancharaiah, Vice Chancellor BB Ambedkar University, Lucknow

Agricultural Growth in Kerala: Dr. Pushpangadan. CDS, Trivandrum

Agricultural Growth in Tamilnadu: Dr. K. Nagaraj, MIDS, Chennai

Agricultural Growth in Andhra Pradesh: Dr. S. Subrahmanyam, CESS

Aricultural Growth In Karnataka: Prof. R.S. Deshpandey, ISEC, Bangalore

Rapporteurs: Prof. Sudhin Mukhopadyay, kalyani University

Dr. Sanatan Nayak, GIDS, Lucknow

13.30-2.15 **Lunch**

14.15-15.45 **Technical Session VI: State Experiences-Bihar and West Bengal**

Chair: Prof. K. Nagaraj, MIDS, Chennai

Agricultural Growth in Bihar: Dr. Alakh N. Sharma, IHD, New Delhi

Agricultural Growth in West Bengal: Prof. Sudhin Mukhopadhyay, Kalyani University, Kalyani

Rapporteurs: Prof. P.K. Sinha, Lohia University, Faizabad

Dr. Shakti Kumar, Lohia University, Faizabad

16.00-16.15 **Tea Break**

16.15-17.30 **Technical Session VII: State Experiences: Rajasthan, Gujarat and Madhya Pradesh**

Chair: Prof. S.S. Gill, Punjabi University, Patiala

Agricultural Growth in Rajasthan: Dr. Vidya Sagar, IDS, Jaipur

Agricultural Growth in Gujarat: Dr. Niti Mehta, SPI, Ahmedabad

Agricultural Growth in Madhya Pradesh: Dr. D.C. Sah, MPISSR, Ujjain

Rapporteurs: Prof. S. Subrahmanayam, CESS, Hyderabad
Dr. Fahimuddin, GIDS, Lucknow

Wednesday 29th March 2006

9.30-11.30 **Technical Session VIII: Agricultural Development in U.P.**

Chair: Prof.Surjit Singh, IDS, Jaipur

Papers by

Prof. A.K. Singh, GIDS

Prof. NMP Verma, Ambedkar University, Lucknow

Dr. V.W. Ambekar, Retd. Director Agriculture, UP

Prof. P.K. Sinha & Shakti Kumar, Avadh University, Faizabad

Dr. Fahimuddin, GIDS

Dr. R.C.Tyagi, GIDS

Rapporteurs: Dr. S.S.A. Jafri, GIDS, Lucknow
Dr. P.S. Garia, GIDS, Lucknow

11.30-11.45 **Tea Break**

11.30-13.30 **Technical Session IX: Agricultural Development in U.P. Contd**

Chair: Prof. Vidya Sagar, IDS, Jaipur

Papers by

Prof. D.M. Diwakar, GIDS

Prof. Yashvir Tyagi, Lucknow University

Prof. Mohd. Muzammil, Lucknow University

Dr. Bimal Kumar, GB Pant Institute, Allahabad

Dr. Sanatan Nayak, GIDS

Shri Yogesh Bandhu

Rapporteurs: Dr. R.C. Tyagi, GIDS, Lucknow
Dr. Nomita P. Kumar

13.30-14.30 **Lunch**

14.30-15.30 **Technical Session X: Agricultural Development in U.P. Contd**

Chair : Prof. P.K Sinha, Avadh University, Faizabad

Papers by

Dr. R.S. Tiwari

Dr. Nomita Kumar

Ms. Poonam Singh

Rapporteurs: Dr. Y.P. Singh, GIDS, Lucknow
Smt. Gunjan Pandey, GIDS, Lucknow

15.30-16.30 **Valedictory Session**

Chair: Shri Venkatachalam, Principal Secretary
Planning, Govt. of U.P.

Welcome & Overview: Prof. AK Singh, GIDS

Rapporteurs Reports

Chairman's Address

Vote of Thanks Prof. AK Singh, GIDS

16.30-17.00 **Tea**

List of Authors and the Title of Papers

Sl. No.	Author(s)	Title of the Paper
1.	Richa Singh	Agricultural Growth in Pre and Post Reform Period : An Inter-State Study
2.	Niti Mehta	Performance of Agriculture in Gujarat : Some Recent Evidence
3.	Y.K. Alagh	Regional Agricultural Development – Economic Policy Impacts
4.	T.N. Jha	Rigidities and Inefficiencies in Commodity Production : A Case of Gorgon Nut (Makhana)
5.	R.S. Tiwari	Kisan Credit Scheme in Uttar Pradesh : Problems and Prospects
6.	P.K. Sinha & S. Kumar	Land, Credit, Output and Income Relationship in Agriculture (A Micro Study of Faizabad Districts in Uttar Pradesh)
7.	T. Haque	Agricultural Price Policy in the Wake of Economic Liberalisation
8.	Nomita P. Kumar	Agricultural Development with Knowledge Breakthrough in Uttar Pradesh
9.	Yogesh Bandhu Arya	Trade Competitiveness of Wheat and Rice : A Case Study of Uttar Pradesh
10.	J. Jeyaranjan & K. Nagaraj	The Agrarian Situation in Tamil Nadu
11.	Srijit Mishra & Manoj Panda	Agricultural Growth in Maharashtra
12.	R.C. Tyagi	Growth Performance of Sugarcane Crop and Problems of Its Marketing in Uttar Pradesh
13.	Fahimuddin	Crop Diversification in Uttar Pradesh : Need of Policy Reorientation
14.	Sanatan Nayak	Development of Irrigation in Uttar Pradesh : Extent and Dimension – How Strong and How Weak
15.	K. Pushpangadan	Analysis of Kerala's Agriculture Under World Trade Organisation
16.	Ramesh Chand	Achieving Four Percent Growth Rate in Indian Agriculture : Possibilities at State Level
17.	Prem S. Vashishtha & Linu M. Philip	Spatial and Farm Size Group Variation in Fertilizer Consumption and Subsidy : Haryana
18.	D.M. Diwakar	Farmers in the Debt Trap and Despair : An Exercise Towards Understanding Challenges to Agricultural Growth
19.	J.P. Singh	Recent Trend in Production and Marketing of Paddy in Selected States of India

20.	Surjit Singh	Indian Farmers at the Crossroads : Some Evidence from States
21.	Sudhin K. Mukhopadhyay	Agricultural Development in West Bengal : Performance and Paradoxes
22.	V.S. Vyas	Challenges Before Indian Agriculture (Inaugural Address)
23.	R.S. Deshpande & Neelakanta, N.T.	Agricultural Performance in Karnataka : During Reform Period
24.	Alakh N. Sharma & Anjani Kumar	Agricultural Development in Bihar : Performance, Constraints and Strategies
25.	V.W. Ambekar	Agricultural Growth in Uttar Pradesh : Status-Problems-Possible Remedies
26.	A.K. Singh	Why has Agricultural Growth in U.P. Declines?
27.	Sucha Singh Gill	Post-Reform Performance of Punjab Agriculture : From High Growth to Stagnation
28	G.S. Bhalla	Keynote Address
29.	S. Subrahmanayam, P. Aparna & C. Durga	Agricultural Crisis in Andhra Pradesh : Causes and Remedies
30	Poonam Singh	Public Investment in Agriculture in Uttar Pradesh: Trends, Constraints and Prospects
31.	D.C. Sah	Failing Agriculture, Livelihood Struggles and Poverty in Madhya Pradesh

Report on the National Seminar on Agricultural Growth in the Post Reform Period: Regional Perspective

Held at
The Giri Institute of Development Studies, Lucknow
March 27-29, 2006
by
Ajit Kumar Singh
Director, GIDS

Inaugural Session

The session was chaired by Prof. Y.K. Alagh, Chairman, GIDS. The Inaugural Address was given by Prof. V.S. Vyas, Chairman, IDS, Jaipur and the Key Note Address was presented by Prof. G.S. Bhalla, Emeritus Professor, CSRD, JNU, New Delhi.

The proceedings began with Prof. A.K. Singh, Director, GIDS, welcoming all the participants who had come from different states covering the length and breadth of the country thereby giving a truly national flavour to the seminar. He then congratulated Prof. V.S. Vyas, who has been bestowed with the honour of Padma Bhushan by the President of India this year.

Talking briefly about the seminar Professor Singh pointed out that despite the fact that the contribution of agriculture to GDP had declined to below 25 per cent it was still an important sector of the Indian economy since a large proportion of our workforce was engaged in agriculture and the growth of other sectors was affected by agricultural growth. During the last 15 years the agricultural sector has witnessed a deceleration in growth, which is a cause for concern. At the same time the performance has varied in different states, which are also faced with different problems. The seminar is expected to focus on these issues. Professor Singh thanked the Planning Commission, ICSSR and NABARD for the financial support provided by them for organising the seminar.

Prof. Vyas began his inaugural address by stating that Indian Economy had witnessed creditable growth in recent years. This growth had been fuelled by industry and the service sector, but the record of the agricultural sector has been lacklustre. The low growth in agriculture was a new experience for India. During the 1970s and the 1980s agricultural growth was widespread and pervasive. The reasons for high growth of agriculture in the past were: the

objective of food self-sufficiency was well defined; concerted and simultaneous efforts were made to synchronise the roles of technology, organisation and agricultural policy; the guiding principle of price policy was that Income Terms of Trade should remain in favour of the farmers. However, this had some negative aspects as well. There was a bias in favour of irrigated food crops and rainfed crops were neglected. The growth had a detrimental impact on natural resource base as land and water management issues did not get due attention.

Prof. Vyas observed that the deceleration, which Indian agriculture has witnessed of late, is said to be the result of three factors: adverse terms of trade for agriculture; impact of WTO; and small size of holdings. Prof. Vyas did not agree with these explanations. In his opinion the main factors responsible are: incongruence between our agrarian system and supportive institutions; too much reliance on output prices; deceleration in public investment in rural infrastructure; and improper Minimum Support Price policy. He argued that if Indian agriculture is to be improved then there is a need to: stop deterioration in the production base; reform supportive institutions like research, extension, credit and marketing; accelerate public and private investment in agriculture; encourage high value agriculture along with risk mitigating policies and programmes like crop insurance and forward trading; make agriculture cost effective by efficient use of purchased inputs; and make conscious efforts to link agriculture growth with non-farm activities in rural areas.

In the long run he asserted that agriculture has to be strengthened because of the livelihood concerns. In the end he stated that although agriculture is the major responsibility of the States to meet the challenges but even the Centre must bear in mind that it also plays a crucial role since it continues to control pricing and trade policies.

Delivering the Key Note address Prof. G.S. Bhalla pointed out that in the world scenario cereals can be grown with greater comparative advantage in land surplus countries while the labour surplus countries have a better advantage in crops like fruits and vegetables which are more labour intensive. In India he pointed out that 60 per cent of our labour is still dependent on agriculture.

He presented a detailed picture of the performance of agriculture at the national and the regional levels. He pointed out that growth in agriculture had grown barely at 1.9 per cent during 1997-98 – 2001-02, while in the same period GDP had registered a growth rate of 5.5 per cent. Moreover, the compound growth rates of area, production and yield for the major crops were much lower during the period 1990-91 to 2003-04 as compared to the earlier period.

If one looked at figures of exports of agriculture, its share in total exports had declined to 11.9 per cent during 2004-05 as against 20.5 per cent during 1996-97. Consequently imports have been rising and trade balance is going down. The terms of trade have stagnated after 1996-97 and this could be a major factor for decline in agriculture.

He went on to point out that growth of agriculture in most states had registered a decline between 1993-94 and 2003-04 as compared to 1983-84 to 1993-94. This decline is particularly high in the states of Punjab and Haryana, the exception being only a few states like Bihar. Even in U.P. the situation is not very bad.

Per worker productivity has not grown substantially to generate demand for boosting the growth of the secondary sector. Prof. Bhalla questioned some of the policies under the liberalized regime and stated that all that was done in the past was not undesirable. He strongly defended the Minimum Support Price for foodgrains. He asserted that agriculture should not be neglected simply because its contribution to GDP has shrunk to below 25 per cent because even now over half of the population is dependent on agriculture. He felt that agriculture in India must be seen as a vehicle of growth for the non-farm sector. In this context he cited the example of China, which used agricultural growth for industrial development.

The keynote paper was followed by the Presidential Address by Prof. Y.K. Alagh, which focussed on economic policy impacts on regional agricultural development. He began by pointing out that since the early 1990s economic policy in India has neither the intention nor the wherewithal to determine or significantly influence sectoral and regional aspects of economic development.

During the 1990s there was higher growth in crops that were grown in rainfed regions since the former Green Revolution states showed growth fatigue. However, overall growth of agriculture declined. Growth rates of rice fell because of a distinct anti-grain bias in economic and technology policy and in the case of oilseeds because of large imports with low tariffs. Large imports of cotton also led to shrinkage in the area under cotton in Deccan. The profitability decline has hurt the poor regions much more.

He pointed out that the last decade has seen a decline in agricultural growth in countries like china, Japan and Vietnam also. However, there has been some turn around in the last two years and the Global Agricultural Cycle seems to have turned. Therefore, it is important to consolidate the positive trends and build a sound foundation for the agricultural and rural economy in the Eleventh Plan.

He felt that the introduction of EGS, if properly implemented, could improve development of soil and water infrastructure in dry and rainfed regions and this would be an important step forward. Reduction in bank interest and improvement in credit supply should also help the cause of Indian agriculture.

Prof. Alagh supported a pro-active role of agricultural policy and asserted that the states should intervene in the markets. Pointing out incongruities in the policy he mentioned that the import price of wheat and fertilisers are higher than domestic prices leading to transfer of income out of the country. Technology, infrastructure and profitability all play a significant role in promoting growth of individual crops. He felt that the regions could grow if MSP and tariff policies improved the profitability of the crops it grows. Also the recent emphasis on technological support could be a boon if profitability of farming improves. He laid especial emphasis on promoting short duration food crops and hybrid rice. Legal issues related to domestically developed BT Cotton need to be sorted out.

Technical Session I: Inter-State Pattern of Growth

The first Technical Session was chaired by Prof. G.K. Chadha. The Chairman in his opening remarks drew attention towards the changing context during the green revolution period and macro-economic view of the present. The green revolution was supported by technological changes, price support and supportive macro policy framework. But it was accompanied by ecological costs. In his view agricultural growth has tapered off due to the ecological decline and declining market support in the changed contemporary reality. Agricultural GSDP has declined in as many as 13 states, while agricultural employment has declined in 15 states.

Prof. Chadha talked of the 'evergreen revolution,' which considers not only resource depletion but market rigidities and technological fatigue too. He especially underscored the challenges facing sustainability of agricultural growth, which is very important in the context of declining returns from agriculture and the syndrome of working poor. Marginal and small holdings now dominate the agricultural scene. Institutional changes are required to deal with the situation.

He also underscored the importance of investments especially for rejuvenating and sustainable technologies impinging soil, water and dry land agriculture. Institutional mechanisms such as co-operatives farming and processing, public- private partnership models, etc. were also important for competitive farming in the present context. He ended by making a strong plea for creating social safety nets like crop insurance for protection of the farmers.

The first paper of the session was presented by Ms. Richa Singh, CSRD, JNU and was devoted to "Agricultural Growth in Post-Reform Period: Inter-State Comparisons". The paper analyses the state-wise growth rate in value of agricultural output and yields of foodgrains in the pre and post reform periods. At the all-India level, the paper also looked at output trends of major crops. This has been done by analysing the growth rates of output through fitting a kinked exponential model to eliminate the discontinuity bias. The results indicated a spatially well spread and even growth of agriculture in the 1980s. In the 1990s a deceleration in growth, which was widespread geographically was observed. However, value of output reportedly

accelerated in 10 states. In post reform period nearly all crops reported a sharp decline in growth and per capita foodgrain availability declined. Examination of trends in area and yields confirmed the shift away from foodgrains happening in most of the states, together with declining yields. This necessitates adoption of corrective measures for reversing the downward trends in agricultural growth, such as increased investments for irrigation, land management, freeing of credit, land lease markets, etc.

In their paper on 'Agricultural Growth in Maharashtra" Srijit Mishra and Manoj Panda highlighted the structural ratios and the sluggish nature of growth in Maharashtra agriculture. The area, production and yields of principal crops were examined together with gross value of output. Division-wise cropping pattern was examined. Dynamism in cropping pattern was observed. Area under cereals has declined but that under commercial crops like oilseeds, sugarcane, fruits and vegetables has been going up. Social group-wise distributional implications of cropping patterns were looked into. Only one-third of irrigation potential is utilized. The authors suggested that the sustainable and efficient management of water held the key to agricultural development in Maharashtra. The question of causal factors prompting widespread farmers suicides was examined, including the credit scenario. The authors suggested higher investment in backward areas.

In the discussion that followed focused on methodological issues in measuring agricultural growth related to periodisation and choice of base year for two periods. Attention was drawn to the finding that trend in value of agricultural output do not show deceleration. It was suggested in this context that pooling of data series of 1980s and 1990s was difficult and introduced a bias as relative weights of crops, particularly horticultural crops, have changed. The issues related to decline in public expenditure, excess capacities on small farms and rising costs were also raised.

Technical Session II: Agricultural Prices and Marketing

Technical session third was chaired by Professor G.S. Bhalla. Dr. Sudha P. Rao, Prof. Ravi Srivastava, Dr. Surjeet Singh and Dr. J.P. Singh were the main speakers in this session.

Dr. Sudha P. Rao, Director CACP, spoke on the role of agriculture price policy". She argued that intervention in pricing of agricultural commodities has been an integral part of the policy framework towards agriculture in India. It helped in achieving self-sufficiency in food grain. Substantial part of agricultural income is covered under MSP as CACP recommends MSP of 25 commodities. She referred to the arguments that MSP had led to increase in the burden of food security and it benefited only some regions and crops. Dr. Rao said that two factors needed to be taken into account in doing away with MSP i.e. likely increase in uncertainty of income of farmers and extent to which we can afford to depend on imports. She stressed that MSP is important to give remunerative prices to growers, ensure supplies of foods and minimise volatility of market prices. So it is needed to reduce the transaction costs and improve our technology to make agricultural produce competitive.

Prof. Ravi Srivastava emphasised that reforms cannot be separated from the process of globalisation. This has resulted in redistribution of gains between different sectors and regions. Reforms claimed to eliminate discrimination in agriculture, but the results have been disappointing. Financial sector reforms have affected access of farmers to credit. He argued that reforms emphasise role of markets but in some situations markets are not dominant. Income and barter terms of trade have turned unfavourable to agriculture. He further pointed out that employment in agriculture has stagnated and growth rate of wages in agriculture has declined in the post reform period. He concluded by saying that while there is a need of people to move out of agriculture growth of non-agriculture employment has slowed down.

Dr. Surjeet Singh presented his paper on "Indian Farmers At Cross Roads". He stated that in recent past gains from technology have tapered off. Input prices are going up as a result of which farm incomes have stagnated. Singh observed that financial sector reforms created problem for agriculture and adversely affected the agricultural credit. Total institutional credit is only 5% of the gross value of agricultural output. He questioned the agricultural credit policy because it has not reduced dependence of farmers from non-institutional credit. Banks have a bias in favour of medium and large farmers. He recommended that banks and government have to facilitate small and marginal farmers to avoid non-institutional credit and farmer's distress.

Dr. J.P. Singh's paper dealt with "Production and Marketing of Paddy." The study was based on data from eight major rice producing states. He evaluated average production of paddy, marketed surplus, and prices received by farmers. He observed that marketed surplus is higher in middle and large farm size groups and in those states where rice is not a staple food. Dr. Singh also observed the variations in marketing practices. In Bihar, Assam and Andhra Pradesh paddy is sold to local traders and intervention of public agencies is negligible. In other sample states a major part of marketed surplus is sold to public agencies. Dr. Singh mentioned that in some states price received by farmers is very low. Even public agencies do not pay MSP due to various reasons. He observed that limited period of procurement by government agencies is also a reason for lower prices of agricultural commodities.

Technical Session III: State Experiences-Punjab and Haryana

Prof. Sheila Bhalla chaired the session. The session was devoted to the discussion of Punjab experience. The session had an insightful presentation by Prof. S.S Gill on the performance of agricultural growth in Punjab in the recent years. He pointed out that Punjab, which was regarded as the granary of the country after the success of the green revolution in the state, has reached a stage of complete stagnation in agricultural growth in recent years. Prof Gill explicitly brought out the reasons for this stagnation in agriculture, which reflects the exhaustion of the green revolution technology. The over dependence on a highly commercialized food economy with insignificant diversification in the sector has been seen a prime cause of the stagnation in the agricultural sector in the state in his opinion. He emphasized the need for further R & D in the sector by the state to rectify the situation.

Beginning with characteristics of the agriculture sector in Punjab, Prof Gill stated that the sector was largely based on foodgrain production accounting for 80% of GSA in 2004-05, which in turn was dominated by wheat and rice crops. The stagnation in area and yield of these crops has led to stagnation in the agricultural sector in the state. The potential for expansion of area under agriculture has reached a stage of exhaustion, further there is pressure on land with increased urbanization in the state. Thus, it is largely through yield enhancement that a remedy has to be sought.

Prof Gill explained that 75% of green revolution technology's potential has been realized and any further exploitation of this technology will be a cost enhancing. Already a viability crisis has been generated in the agriculture sector with rate of return to the farmers coming down over the years. This viability crisis has been caused due to a number of reasons. Cost of production has increased due to increasing use of chemical fertilizer, increasing capital intensity due to use of hired labour and excessive mechanization of the agricultural operations. The sector has increasingly come to be dominated by the marginal and small farmers who find the machine oriented agricultural operations as unviable. Custom hiring of equipment from the large and medium farmers have added to their cost of production. Productivity decline and declining profitability of the operations has made the viability crisis for these farmers very acute with a majority desiring an exit from the sector, which is prevented due to lack of alternatives. He further pointed out that environmental degradation has also occurred with soil quality deteriorating. There is over-dependence on ground water causing the water table to decline. Public investment in the sector has been low and has in fact declined. Moreover, the investment has largely been on the revenue account rather than the capital account. This has thwarted the process of technology upgradation and R & D in the sector.

Prof. Gill mentioned that an Expert Committee constituted for the purpose of remedying the situation of agricultural stagnation, suggested crop diversification away from wheat and paddy as a solution. Private partnership on the basis of contract farming was seen as a means to promote diversification. The private companies were to supply new variety seeds, provide extension/advisory services and procure the produce at pre-determined prices. However, this effort completely failed to bring about the desired diversification. This was because the companies did not have their own research centers set up within the state. Seeds, brought from other parts of the country failed to germinate in the changed climatic conditions of the state. Grass root level involvement of the companies was ineffective and largely missing. The procurement process also failed.

In the end Prof. Gill enumerated some suggestions to deal with the situation. He supported continuation of existing cropping pattern, but stressed

the need to manage irrigation better, so as to reduce dependence on ground water. This also required changes in the period of transplanting paddy so that it becomes more viable. However, it has been difficult to implement and perhaps legislations would be more effective. A water policy is needed to check exploitation of natural resources. He argued that there is a need to curb subsidies particularly electricity subsidy. He advocated that electricity should be properly priced and subsidy should take some other form. This will also reduce dependence on mechanized form of irrigation through pumpsets and tubewells. He suggested that alternative viable crops such as cotton need to be promoted as replacements to paddy in areas like southern Punjab where paddy cultivation is not very feasible. Greater organization of the sector with greater involvement of the farmers through collective marketing and processing of produce is also needed. He ended by suggesting that intervention is required to check over capitalization of the sector.

The presentation was followed by a lively discussion. Prof. Alagh emphasized the need to strengthen the profitability of agriculture in Punjab with a view to increase its competitiveness and a reorientation towards cost reduction, marketing, taxes and subsidies was stressed. He highlighted the failure of contract farming in other parts of Asia such as in Vietnam and suggested limited forms of cooperation as more feasible options. In his comments Prof. G.S. Bhalla stated that diversification away from wheat was not very feasible as the state was highly suited by its climatic and soil conditions to grow the crop. Even paddy, which is not a very environment friendly crop, cannot be ignored, as the cereal economy should not be neglected. Cotton as a substitute crop is also not very well suited and other alternatives particularly during Khariff season such as maize should be considered. A legislative measure was also not very practicable as it would only lead to corruption. Electricity price should be increased and substitutes to rice must be considered while the crop itself should be made less environment degrading. Prof. J.P Singh also expressed concerns regarding soil degradation and suggested groundnut as an alternative crop. Prof. Mukhopadhyay suggested feed and fodder as a substitute crop. Prof. Gill responded by stating that there already existed an excellent combination of feed and fodder in the cropping pattern, which was the main reason why the

dairy sector was thriving so well in the state. However, expansion of dairy had its own limitations due to the demand and market constraints. Some substitutes to rice in the form of oilseeds have emerged. The real need was to reduce subsidies as without it also the Punjab agriculture remains highly competitive in the state. Also, there is a need to increase the accountability of the public sector especially in research and extension as the private sector in this area lacks competence.

Technical Session IV: Agricultural Growth in Southern States

This session was chaired by Prof. G. Nancharaia, Vice-Chancellor, Dr. B.B. Ambedkar University, Lucknow. The agricultural growth performance of the four south Indian states, namely, Kerala, Tamil Nadu, Andhra Pradesh and Karnataka were high lighted in this session. The key speakers were Prof. Pushpangadan, CDS, Trivandrum, Prof. K. Nagaraj, MIDS, Chennai, Prof. S. Subrahmanyam, CESS, Hyderabad, Prof. R.S. Despande and Mr. Nilakantha, ISEC, Bangalore. The commonality observed in all the four states so far as agricultural performance was concerned was the deceleration of output of major crops with certain degree of diversification, modernisation and marketisation. The deceleration was caused by different factors related to geographic, climatic, soil and policy changes.

Pushpangadan analysed the agricultural performance of Kerala in the last four decades. He drew attention to the sharp growth of NSDP in Kerala along with stagnant agricultural growth. Sharp growth of NSDP was mainly supported by the growth of the service sector, while both primary and secondary sectors have declined in 1990s. For the analysis of growth performance, he has applied Dharan Narain's decomposition analysis. The growth rate is decomposed into three important factors, viz. cropping pattern effect, locational effect, pure yield effect. The growth in productivity is mainly determined by pure yield effect followed by cropping pattern effect and locational effect during 1980's. In the 1990's, cropping pattern effect played crucial role in total changes in productivity. However, two important competitive non-foodgrain crops, viz. coconut and pepper showed negative

growth in recent years. Prof. Pushpangadan concluded with the suggestions that location-specific technologies have to be evolved.

K. Nagaraj analysed agricultural growth performance of Tamil Nadu. He observed that Tamil Nadu agriculture is characterised by a relatively higher degree of modernisation, diversification, and marketisation without basic transformation. Land has been transferred from higher to lower castes and social gap has been diminished. But, still the economic polarisation is strong, i.e, high landlessness is accompanied with land concentration. Tamil Nadu has recorded modest growth just 1.4 percent per annum for foodgrain, which is less than population growth. Stagnation is observed In case of all major non-foodgrain crops. Low growth is accompanied by high degree of fluctuations. Analysing the factors behind this stagnation, Nagaraj pointed out that there is a crisis in irrigation with complete stagnation of canal irrigation, along with decline of tank irrigation. Though tubewell irrigation has increased, ground water system has reached a plateau. Moreover, there has been a sharp dichotomy between irrigation and un-irrigated areas. The quality of irrigation has declined with water disputes and heavy use of ground water. He also raised the question why suicides did not occur in Tamil Nadu unlike the experience of other states like Andhra Pradesh? This was in his opinion due to strong support system in the state and strong farmers' movement.

Prof. S. Subrahmanyam in his paper evaluated the growth performance of Andhra Pradesh. His paper highlights the growth performance of major crops in recent years, the causes of deceleration and the possible remedies. For measuring growth he has applied the Divisia Index method due to its methodological advantages. The analysis of the results shows that there has been deceleration in rice, coarse cereals, foodgrains and oilseeds in recent years in the state. He analysed the factors responsible for decline in the agricultural sector in detail. A major factor has been the decline in net and gross irrigated area in recent years, mainly attributed to decline in irrigated area by canals and tanks. Variation in weather conditions and frequent failure of monsoon also affected agricultural growth. Though the prices of agricultural commodities have increased, agriculture is not remunerative enough. Capital formation in agriculture has declined. He also drew attention to the failure of

the extension services and referred to the prevalence of high indebtedness among farmers and their exploitation by informal credit agencies.

Prof. R.S. Deshpandey and Mr. Nilakantha discussed the growth performance of Karnataka agriculture in their paper. The paper highlights the growth of crop economy and its influence on the aggregate performance of the sector and the input/resources as the strong drivers of production growth. Foodgrains in Karnataka showed better performance in the 1990's. However, there was deceleration in growth of output in case of cotton and negative growth of oilseeds. Deceleration was caused mainly by the increase in fallow land, constancy of NSA and moderate cropping intensity, increasing fragmentation of holdings, over use of water resources, unsatisfactory infrastructure development and low research and extension efforts. Moreover, flow of credit to agricultural sector has slackened during 1990s. They called for higher investment in research and development and better technological options supported by safety net programmes for farmers.

In the discussion that followed Prof. G.S. Bhalla pointed out that the decomposition exercise is not useful for policy making. He also observed that yield comparison is not proper for analyzing comparative cost advantage of countries. Dr. Surjit Singh felt that the experience of exports of agricultural products from Kerala is not encouraging and there are limits to investment in agriculture.

In his presidential remarks Prof. Nancharia drew attention to the farmers suicides due to poor access to institutional credit, spurious pesticides, frequent droughts, etc. He also felt that the question of land ceilings needed to be looked into in view of the prevalence of high landlessness.

Technical Session V: Agricultural Growth in West Bengal and Bihar

The fifth Technical Session was chaired by Prof. K. Nagaraj. Two papers were presented in this session. The first paper was presented by Prof. Sudhin Mukhopadhyay, who examined the agricultural performance of West Bengal. Prof. Mukhopadhya was of the opinion that agriculture in West Bengal has experienced variations in its growth rate since the implementation of green revolution. Agriculture experienced astonishing growth in the 1980s in

the wake of land reforms. Irrigated area expanded resulting in expansion of gross sown area along with increase in feriliser consumption. During this period many changes have taken place like shift from foodgrains to non-foodgrains production and non-crop farm production along with allied activities like fishery, poultry and dairying.

Professor Mukhopadhyay stressed the fact that as a result of satisfactory growth of agriculture the attention of policy makers shifted to the industrial growth. He questioned the wisdom of this policy shift as it raises questions about the well being of the rural people. The share of agriculture in SDP has been declining consistently and rural-urban differentials are also on the increase. Rural poverty in West Bengal is much higher than in the urban areas. The poor farmers are shifting from farm activities to non-farm activities causing the growth of the unorganised sector. He ended his presentation by posing the question that where the fruits of all the developments of the state are going?

The paper of Dr. A.N. Sharma and Anjani Kumar dealt with the performance of Bihar agriculture. Presenting the paper Dr. Sharma opined that performance of agriculture in the state was a modest one. Allied activities like fisheries, vegetables and fruits cultivation and poultry, etc. show a high growth in the last decade in the state. Around 87 percent of cultivated area is under foodgrains. However, over the period cropping pattern is also undergoing a change in favour of horticultural crops. Productivity has increased but remains relatively low. Increased remittances and higher investment in agriculture have played a role in agricultural diversification.

He mentioned that Bihar has comparative advantage in agriculture on many counts like fertile soil and plentiful water resources. But there are some constraints are inherent in the state retarding agricultural progress. Large areas are water logged. The quality of irrigation is poor and reliance on diesel pump sets raises the cost of production. Around one fourth area is under insecure tenancy. Due to ineffective procurement system by the state the price received by the farmers are low.

In the end he suggested that the policy makers should properly address these constraints. There is an urgent need of large investment in water management and flood control. Agro processing needs encouragement.

He also favoured opening up of the lease market in the interest of small and marginal farmers.

The discussion that followed the paper presentation focussed on issues like the impact of agricultural growth on reduction in rural poverty, development of hydel power and strengthening the procurement system.

Technical Session VI: Agricultural Growth in Rajasthan, Gujarat and Madhya Pradesh

The sixth Technical Session was devoted to the agricultural growth in the states of Rajasthan, Gujarat and Madhya Pradesh. The session was chaired Prof. S.S. Gill of the Punjabi University, Patiala.

The first speaker was Dr. Vidya Sagar from IDS, Jaipur. His paper analyzed the salient features of agriculture in Rajasthan, its growth performance, diversification, agricultural policies, and financial liberalization and farm credit. Agricultural growth was fairly high in the eighties due to the high growth in output of oilseeds, vegetables, spices and cotton. This was supported by the growth of area under HYV, expansion of irrigated area and increased use of fertilizers. High support prices of wheat and mustard had a positive impact on their output growth. The growth rate of crop output declined sharply in the nineties.

Dr. Vidya Sagar pointed out that the impact of agricultural trade liberalization has been adverse to the interest of the state of Rajasthan as liberal oil imports depressed mustard prices. In a small economy like Rajasthan, higher imports of crops like edible oils are against the interest of the oilseed growers of the state. If the loss of employment and taxes to state from processing of oilseeds or other crops were also considered the welfare loss due to depressed prices would be further higher. He was of the view that the agricultural policies pursued during the nineties have been detrimental to the state's economy from the point of environment, employment and diversification. The financial liberalization has also had an adverse impact on agriculture. Public investment has also declined in the nineties.

The next speaker was Dr. Niti Mehta from the SPI, Ahmedabad. She presented her paper on the Performance of Agriculture in Gujarat: Some

Recent Evidence. Her paper analyzed the impact of technology on yield levels during pre and post liberalization periods and examined the growth in productivity of agricultural workers. The main findings were that the nature of agriculture has been changing during the eighties and the post liberalization phase. The growth in yield was found to be the major source of output growth rather than growth in area. The decade of eighties was marked by crop diversification, which was further consolidated during post liberalization period. Agriculture in the state is marked by the rising cost of inputs due to reliance on ground water and mechanization with declining profits. Agricultural growth has slowed down and labour productivity has declined. To deal with the problem of agricultural sector she suggested increased government investment in irrigation, infrastructure and research and support to agro processing activities. She also underlined the importance of resource management strategies in a state with low and erratic rainfall.

The third speaker was Prof. D.C. Sah, Director Madhya Pradesh Institute of Social Science Research, Ujjain. Prof. Sah presented the features of the agriculture economy of Madhya Pradesh. He noted that during the late nineties growth in agriculture could happen because of soybean cultivation, but this could not be sustained due to ecological factors. He was of the view that agriculture in the state has not performed well. Rainfall has been erratic. Ecological deterioration has occurred and tubewells have dried. He pointed out that the marginal and small holdings are no longer viable leading to large scale out-migration Prof. Shah suggested that large scale investment is needed particularly on irrigation projects to develop agriculture and enhance the income of people in state. Water harvesting and conservation should be encouraged. Finally, efforts should be made to improve the living conditions of the people migrating from rural areas at the point of migration place.

In the discussion that followed the presentations it was emphasized that though diversification is higher in the dry states, its sustainability poses major problems. Oilseeds economy, which is important for these states, has been adversely affected due to globalisation process threatening the livelihood of the rural poor.

Technical Session VII: Agricultural Growth in U.P.

The session was chaired by Prof. D.C. Sah, Director, MP Institute of Social Science Research, Ujjain. The discussion in the session was devoted to the issues related to agricultural growth in U.P.

The discussion was initiated by Prof. A.K. Singh, Director, GIDS. He started by observing that in U.P. horticulture, floriculture and dairy production reflect a success story. Vegetable production is 4-5 times more lucrative than foodgrain cultivation. Being a labour intensive activity, vegetable production is carried out mostly small farmers belonging to OBCs. He also observed that there is a lack of authentic data on horticulture area and production.

Referring to the performance of the foodgrain crops Prof. Singh pointed out that the growth rate in foodgrain is lagging behind population growth rate in U.P. in the recent years. Except potato most of the agricultural crops showed a slow or negative growth rate. Decline in production of agricultural output was mainly because of the decline in crop yield growth. Analysing the factors responsible for deceleration in agricultural output, he referred to the fact that both net and gross sown area in the state have remained static. The growth rate of main growth inducing Inputs like use of chemical fertilizer, irrigation and credit has declined. The level of input use and yields in U.P. are also quite low in comparison to Punjab and Haryana. He stressed that a major constraint in agricultural growth in U.P. is the preponderance of the small and marginal farmers, who do not have enough resources to invest. At the same time their access to institutional credit is also restricted.

The second paper was by Dr. V.W Ambekar, former Director of Agriculture, U.P. He observed that in U.P. productivity of rice and wheat is quite low as compared to that in Punjab and Haryana, Similarly, yields of sugarcane are lower as compared to Tamil Nadu and Maharashtra. In his opinion low productivity in U.P. was due to comparatively less area under irrigation, small holdings, low fertilizer application, low consumption of electricity, low credit-intake, land degradation, poor farm water management, etc. He drew attention to the deterioration in the canal irrigation system. Tubewell irrigation is also facing problem due to poor and erratic power supply in rural areas, with the result that the farmers are operating on diesel engines

which raises their costs. He suggested various measures for agricultural improvement in the state such as technology transfer through extension services, dissemination of market-information, diversification of agriculture, crop insurance, etc. Rural infrastructure needs to be improved. Though road system is increasing, but investment in power and irrigation has to be stepped up. Around 35 lakh hectare area is under different types of wastelands should be reclaimed through appropriate technology. Finally he suggested that access to credit should be improved by forming self-help groups of farmers.

The paper by Prof. P.K. Sinha and Dr. Shakti Kumar of Avadh University Faizabad dealt with land credit, output and income relationship in agriculture. It was based on a micro-field study of farmers in Faizabad district of U.P. It is concluded that there is an inverse relationship between per acre production and farm size. Per acre cost of production decreases with rise in the farm size. Per acre demand for credit increases with rise in the farm size. Availability of credit has a positive impact on per acre productivity. Per acre income is found higher in case of borrowing farmers than non-borrowing farmers. The large farmers get a better price for their produce as compared to the small farmers.

Dr. Fahimuddin, GIDS, spoke about crop diversification in Uttar Pradesh. He pointed out that agricultural economy in U.P. has been largely food crop based. Wheat and rice are occupying maximum area. The pace of commercial crops has been slow. In fact percent area under commercial crops has declined in western region during 1990-91 and 1999-2000. Only central region shows a clear increase in area under commercial crops. The role of cropping intensity in boosting the area of cash crops has been found to be negligible. In his view in the era of economic liberalization and WTO, crop diversification in agriculture is needed based on a market oriented development strategy. Author suggested shifting of food crop area to high value crops. Adequate infrastructure support is needed to facilitate the process of agricultural diversification.

The last paper of the session entitled "Growth Performance of Sugarcane Crops and Problems of Its Marketing in U.P.," was presented by Dr. R.C. Tyagi, GIDS. The paper pointed out that the performance of sugar cane crop in the state is not satisfactory as compared to national level.

37352

Productivity is coming down both at national and state level. It was emphasized that improvement in productivity can be achieved through the use of modern technology and improved quality of seeds. The author was of the opinion that price of sugarcane should not be fixed on political considerations. Rather price of sugarcane should be fixed by central government on a long-term basis to avoid the clash between mills associations and cooperative growers association. In this way, it would be possible to ensure and stabilize cane acreage and sugarcane marketing.

The discussion that followed raised issues related to viability of small farms and problems of diversification like the role of support prices and problems of marketing and failure of extension agencies.

Technical Session VIII: Agricultural Growth in U.P. (Continued)

The session was jointly chaired by Prof. Sudhin Mukhopadhyay and Dr. J. P. Singh. The session started with the paper by Prof. D.M. Diwakar, GIDS, which dealt with the issue of farmers in the debt trap and despair based on recent NSS Report. The paper analysed the dimensions and genesis of rural indebtedness, credit market and institutions and their implications on Indian farmers. It stated that rural indebtedness is indicative of deficiency of rural income for livelihood support. Contribution of agricultural sector to GDP is declining because of its cumulative neglect. Farmers and agricultural labourers have to resort to borrowings for production and consumption needs. Study brought out the fact that rate of indebtedness and amount of loan was directly related with increasing size of land holding and with higher MPCE class. Major amount of loan utilised were for capital expenditure and current expenditure of farm and non-farm business. A significant amount of loan was spent on essential consumption expenditure, marriage and other ceremonial occasions. Borrowing for education and health was the least. The study corroborated the fact that formal sector provided 57.7 per cent of loan amount. He mentioned that declining investment and inadequate infrastructure poised problems for institutional and technological transformation and modernization of agriculture. Poor support system for

credit, input, insurance and marketing with dependence on monsoon resulted in crop failure and lower returns leading to misery, distress and despair.

Dr. Sanatan Nayak, GIDS discussed issues related to irrigation in U.P. He started the presentation by giving overview of the state economy. The state is the third highest irrigated state in the country with 76.3 per cent area under irrigation. It is one of the major contributors to agricultural production in India. Due to expanding irrigation infrastructure U.P. could reap the maximum benefit of green revolution. Dr. Nayak pointed out that intensive use of land along with agricultural inputs has reached a saturation point and has started declining or remained constant. The declining trend of major crops in recent years in the state is largely related to the performance of the irrigation sector. Role of public sources of irrigation has declined and private sources dominate the scene.

Dr. T.N. Jha focused on the issues of agricultural marketing. He said that inducement effect of commodity price on agricultural growth is well established. He raised the issue that commodity prices are depressed to the extent of 20-30 per cent due to problems of marketing. This adversely affects the net margins, farm profitability, adoption of new technology and investment. The efficacy of MSP and agricultural producers marketing cooperative as tools to hedge price risks has of late been found weak. Dr. Jha pointed out that marketing infrastructure remains under-utilised due to narrow command area of regulated markets and coverage of select crops. Role of intermediaries remains important. He reiterated that physical infrastructure building has gained wider attention. But adequate steps have not been taken to promote institution building to match the emerging needs. Given cost ineffective marketing agriculture commodities become price uncompetitive. Due to sensitivities of consumers to agricultural prices, over pricing becomes an unwarranted burden on them. He underscored the point that agricultural policy has to address these issues.

Prof. Yashvir Tyagi, Department of Economics, Luckow University, in his talk began by saying that since 1990s there has been a paradigm shift in the economic policy framework. Therefore, agriculture should be examined in the context of the changing scenario. He said that in the present context agriculture has to be knowledge intensive. Constraints are operating on input

side. He attributed the failure of agriculture to the fact that agriculture still is cereal based in U.P. as well as at the all India level. Crop diversification is required. Supplementary activities should be taken up by farmers. He highlighted that U.P. has advantage in dairying and fishery. Institutional changes are required in several areas of U.P. There is need to put in place measures for safeguarding the interests of the farming community. Intensive policy intervention is required into extension services by the government. Private sector should be encouraged to promote such services or in the form of public-private partnership. Professor Tyagi also drew attention to the fact that marketing channel is weak in U.P. and needs to be promoted. The Regulated Mandi Act needs to be changed. Energy efficiency should be ensured. If energy is efficiently utilised it will lead to cost reduction in production. He also called for focused attention on exportable products like oilseeds specially sessamum, spices and medicinal plants and livestock products in which U.P. enjoys comparative advantage. He concluded his talk by emphasizing the need of developing a suitable policy framework to deal with the challenges of a dynamic agricultural sector.

Next speaker was Prof. Mohd. Muzammil, Department of Economics, Luckow University, who spoke about the issues related to economic pricing of irrigation water. Irrigation rates are administered prices in India. He highlighted that all irrigated projects are running into deficit. Rational use of water for agriculture is not only important for present but also for future generation as low prices lead to excessive use of water. He also referred to the widespread prevalence of private water markets and stressed the need for a regulatory mechanism to control hiring of irrigated sources. He ended presentation by saying that use of economical method of irrigation should be adopted in view of the rising cost conditions.

The presentations were followed by a lively discussion focused largely on issues related to irrigation. Dr. T.N. Jha started the discussion by mentioning that in the discussions related to debt one should clearly distinguish between credit and indebtedness from the banking sector perspective. Prof. A.K. Singh observed that share of allocation in plan expenditure is not the best indicator of the priority given to irrigation development. Today the important issue is not the expansion of the irrigation

system but that of its proper maintenance. He mentioned that in Rae Bareli district alone 60,000 ha. area has gone out of canal irrigation. Inequality between upper and lower rung of farmers was there. Hence emphasis should be on improving the irrigation management system. He also pointed out that a few years back government tubewells were handed over to Gram Panchayats as part of decentralization process. However, no systematic recording of irrigated area by tubewells is being done not the dues are being collected. Dr V.W. Ambekar underlined the need of finishing the incomplete irrigation projects and restructuring of the existing canal system. He suggested that the Employment Guarantee Scheme should be utilized for canal restructuring and cleaning of silt.

Technical Session IX: Agricultural Growth in U.P. (Continued)

The discussions on U.P. were continued in the last session, which was chaired by Prof. P.K. Sinha, Avadh University, Faizabad. Papers were presented by Dr. R.S. Tiwari, Shri Yogesh Bandhu, Dr. Nomita Kumar and Ms. Poonam Singh.

Dr. Tiwari in his paper examined the various facets of Kisan Credit Card scheme. He began with brief background of KCC Scheme. He gave a comparative picture of U.P. vis-à-vis All India status in terms of three indicators, namely, (i) amount of loan per hectare; (ii) amount per borrower; and (iii) percentage of farmers. U.P. showed a very dismal picture in all 3 respects. He highlighted the various problems related to the implementation of the scheme, e.g., lack of awareness, high rate of interest, time consuming procedures, etc. In the end gave some suggestions for improving the working of the scheme like better publicity of scheme through media, decreasing the rate of interest and reduction in time in processing of loan applications.

Yogesh Bandhu in his paper examined the trade competitiveness of wheat and rice crops in U.P. under importable and exportable scenarios. His analysis showed that in recent years wheat and rice produced in U.P. have become non competitive. The gap was found to be higher in case of wheat as compared to rice.

Dr. Nomita Kumar in her paper emphasized the importance of knowledge revolution currently taking place. Knowledge has replaced capital as an important factor of production for economic development. She linked

knowledge to investment in human capital, which is particularly important for dissemination of new techniques through education. She emphasized the need for farmers to become 'knowledge workers' to exploit latest information and knowledge about cultivation practices, inputs and output markets. Talking about U.P. agriculture she mentioned that its share in state income has gone down steeply, but the dependence for employment on this sector has declined only marginally. Using NSS data she discussed the educational profile of U.P. farmers and compared it with that of Indian farmers and brought out the pathetic condition of farming community in U.P., where most of the farmers belong to not literate category. She also depicted the low level of awareness of farmers of U.P. about bio-fertilizers, market supply price and WTO. She emphasized that in order to achieve higher growth in agricultural sector education of farming community is necessary. This requires prompt efforts by the government for strengthening of public extension services in terms of resources, trained manpower and adequate infrastructure to provide awareness about latest knowledge and technology to the farming community.

Ms. Poonam Singh in her paper laid importance on the enhancing capital formation in agriculture. She analysed the trends in capital expenditure by the government in agriculture and highlighted the deterioration in public sector investment in agriculture as a percentage to NSDP, total fixed capital formation and also as a percentage to agricultural NSDP. In recent years there is a negative trend in the growth rate in gross capital formation and gross fixed capital formation in agriculture in real terms. In the end she made a plea for policy measures for fostering private investment in production, marketing and distribution of agricultural products.

Valedictory Sesssion

The valedictory session was chaired by Prof. Sheila Bhalla. Shri V. Venkatachalam, Principal Secretary. Department of Planning, Government of U.P. was the chief guest.

Professor G.S. Bhalla presented an overview of the seminar discussions. He began by saying that the papers have presented different typologies, but all of them bring out a picture of overall deterioration. At the

time of the beginning of economic reforms in the early nineties it was believed that the discrimination against agriculture would end and the terms of trade of agriculture would improve. But, contrary to expectations, nothing of the type happened. Growth rate of output and employment in agriculture has come down. The crisis in agriculture was reflected everywhere. It was especially greater in central states of M.P., Rajasthan, Maharashtra and Gujarat, which are adversely affected by rainfall fluctuations. The problem has particularly affected the oilseed economy due to cheaper imports. There is a dilemma between protecting consumers' interests and producers' interests.

Punjab experience shows the crisis in a highly developed state. Efforts to diversify Punjab agriculture away from wheat and rice have failed. U.P. agriculture has also faced deceleration. Here the main problem is the dominance of marginal farmers. Turning to the eastern states Prof. Bhalla observed that West Bengal agriculture has been doing well, whereas Bihar is face with deceleration with high outmigration of rural population.

Prof. Bhalla addressed the policy issues to reverse the situation. He was highly critical of the laissez faire approach advocated by some experts. There are many contentious issues facing agricultural policy. One such issue is whether foodgrain areas should diversify. He strongly supported the role of minimum support price for obtaining food self sufficiency. However, there is also the need of addressing the issues like environmental degradation caused by rice cultivation caused by high minimum support prices. In dry lands livestock development is needed to augment incomes. He ended by observing that technology deserves highest attention to make Indian agriculture competitive.

Prof. Sheila Balla in her remarks focussed attention on agricultural issues in U.P. She felt that declining farm size is an important issue, requiring diversification out of agriculture. A kind of circular causation is working here, as development of non-agricultural activities is dependent upon a rise in agricultural productivity. How to break this vicious circle is an important question. Higher public expenditure on research and extension and infrastructural development is needed in this context. She also observed that better availability of electricity would reduce dependence on diesel engines and reduce costs. Renewal of irrigation structure also needs priority.

This was followed by presentation of the rapporteurs reports for the various sessions. The chief guest of the session, Shri Venkatachalam, Principal Secretary Planning, U.P. Government observed that the seminar is being held at an appropriate time and will help in formulation of the Eleventh Five Year Plan. The mid-term review of the Tenth Plan has also expressed concern about the poor performance of agriculture. Agricultural productivity has stagnated. In a state like U.P. where nearly 70% population depends on agriculture, the performance of the sector affects livelihood issues. Sustainability of agricultural growth is also an important issue. He emphasized the need of stepping up investment in agriculture. Average holdings have become non-viable. Hence shift to high value crops and development of non-farm activities has become important.

In the end Prof. A.K. Singh, Director, Giri Institute of Development Studies and convenor of the seminar moved a vote of thanks. He expressed thanks to all the participants and paper writers, the organisations which have financially supported the seminar and all faculty and members of the staff of the Institute for making the seminar a success.

Main Conclusions and Recommendations

The main conclusions and recommendations of the seminar are briefly summed up below:

During the 1970s and the 1980s agricultural growth was widespread and pervasive. Simultaneous efforts were made during this period to synchronise the roles of technology, organisation and agricultural policy to sustain the process of high agricultural growth. However, there were some negative aspects of the growth process as well. There was a bias in favour of irrigated food crops and rainfed crops were neglected. The growth had a detrimental impact on natural resource base as land and water management issues did not get due attention.

The growth scenario of agriculture completely changed in the nineties. The compound growth rates of area, production and yield for the major crops were much lower during the period 1990-91 to 2003-04 as compared to the earlier period. The deceleration is visible in nearly all crops and regions of the country with few exceptions. Employment in agriculture stagnated during the

post reform period. Per worker productivity has not grown substantially to generate demand for boosting the growth of the secondary sector.

The seminar focussed on the factors behind the deceleration in agricultural growth. It was noted that the potential of the green revolution technology has nearly exhausted itself. The growth accelerators like area sown, fertiliser consumption and irrigated area have been dampened. Attention was also drawn to the adverse impact of anti grain bias in economic and technology policy and inappropriate tariff policy on agricultural growth.

There was a general consensus in the seminar that the minimum support prices play a significant role in promoting output growth and ensuring income security to the farmers. The farmers are unable to get a fair price for their produce due to the inadequacy of the procurement agencies in the backward states like U.P. and Bihar. Marketing system is inadequately developed and suffers from various defects. The private traders still continue to dominate the agricultural markets.

The tariff policy in the post WTO period has failed to protect the interests of the Indian farmers. The oilseed growers suffered a serious set back in the dry regions like Rajasthan, M.P. and A.P. due to large imports with low tariffs. Similarly, large imports of cotton also led to shrinkage in the area under cotton.

Several speakers pointed out to the decline in public investment in agriculture and rural infrastructure, especially irrigation and research, as a major factor contributing to agricultural deceleration. The issues related to indebtedness of farmers and agricultural credit were also raised. It was pointed out that the financial sector reforms have affected access of farmers to credit. In particular, the institutional credit system has failed to meet the credit needs of the marginal and small farmers, who have to depend on the money lender for meeting their requirements of loans for productive purposes and consumption needs.

The participants emphasized the fact that farm profitability has declined in all states due to the rising costs of the purchased inputs in the face of slow down in productivity growth. The decline in profitability has been accompanied by increased vulnerability due to weather fluctuations and price volatility. As a result of these factors the small holdings have become non-

viable forcing the small farmers to migrate in search of other employment opportunities. On the other side, the support structures like research, extension, credit and marketing have remained weak and ineffective.

The issues related to irrigation were repeatedly raised. It was noted that there has been a slow down in growth of irrigated area. In fact, irrigated area under canals has declined due to the poor maintenance of the canal system. There has been growing reliance on tubewell irrigation, which has created the problem of declining water table due to uncontrolled exploitation of ground water. Moreover, due to erratic and inadequate power supply the farmers have to depend on diesel engines, which raise the cost of irrigation.

The following policy suggestions emerged from the seminar:

Urgent attention is needed to deal with the crisis being faced by Indian agriculture. This is all the more so because agriculture is linked with the livelihood of the large masses which still depend on agriculture. Although agriculture is the major responsibility of the States, the Centre must bear in mind that it also plays a crucial role since it continues to control pricing and trade policies. It was felt that the regions could grow if MSP and tariff policies improved the profitability of the crops they grow. Higher foodgrains productivity is important for food self sufficiency as well as diversification. Hence, the anti foodgrain bias in policy should be reversed.

The issue of declining crop productivity needs to be addressed through an appropriate mix of technology, prices and infrastructure. A pro-active price support strategy is called for to ensure remunerative prices and reduce price fluctuations. Farmers should also be ensured good quality inputs at affordable prices.

There is a need to reform and strengthen supportive institutions like research, extension, credit and marketing. The rigidities and inefficiencies in the marketing system need to be removed. Public procurement system needs to be strengthened in the states where it is weak.

Institutional interventions are needed to deal with the problem of the declining size of holdings and their non-viability. Opening up of the lease market would be in the interest of small and marginal farmers. Farmers organisations needs to be promoted for securing integration and scale economies in input purchase, marketing, storage and processing of produce.

The working of the financial institutions needs to be revamped to improve the access of the small and marginal farmers to credit.

Public investment in agriculture particularly in research and irrigation and rural infrastructure needs to be substantially enhanced. Land and water management issues are critical to ensure sustainable agricultural growth without resource degradation. The introduction of EGS, if properly implemented, could improve development of soil and water infrastructure in dry and rainfed regions and would be an important step forward.

Development and efficient management of water hold the key to agricultural development. The maintenance of old canal networks needs proper attention to check the decline in area irrigated by canals. Regulated use of ground water is needed to prevent its over and unsystematic exploitation. There is a need to curb electricity subsidy to the farmers as it has led to environmental deterioration and over use of ground water. Irrigation from public sources needs to be properly priced. There is also a need to regulate the private water markets.

Cultivation of short duration food crops and hybrid rice needs to be encouraged. This will also facilitate the process of agricultural diversification, Legal issues related to domestically developed BT Cotton need to be sorted out to prevent harassment of farmers.

In view of the reduced profitability of agriculture and increased vulnerability due to weather fluctuation there is a need for creating social safety nets like crop insurance for protection of the farmers.

Efforts are required by the government for strengthening of public extension services in terms of resources, trained manpower and adequate infrastructure to provide awareness about latest knowledge and technology to the farming community.

(I am thankful to the rapporteurs of the various sessions for providing valuable inputs for preparation of this report, namely, Prof. Vidya Sagar, Dr. A. Joshi, Prof. Paramjeet Kaur Gill, Dr. Niti Mehta, Jaya Gupta, Dr. D.M. Diwakar, Yogesh Bandhu,, Richa Singh, Dr. Sanatan Nayak, Prof. P.K. Sinha, Dr. Shakti Kumar, Dr. Fahimuddin, Dr. SSA Jaferi, Dr. P.S. Garia, Dr. R.C. Tyagi, Dr. Nomita Kumar, Dr. Y.P. Singh and Gunjan Pandey.)

REGIONAL AGRICULTURAL DEVELOPMENT - ECONOMIC POLICY IMPACTS

By

YOGINDER K. ALAGH

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



REGIONAL AGRICULTURAL DEVELOPMENT – ECONOMIC POLICY IMPACTS

Yoginder.K.Alagh

Introduction

This paper is in the nature of short notes on the impact of economic policies in the reform period on the regional aspects of agricultural development in India. Since the early Nineties, economic policy in India has neither the intention, nor the werewithal to determine or significantly influence sectoral and regional aspects of economic development. The Structural Adjustment Programme in 1992, was on the explicit basis that the purpose of economic policies would be to replace quantitative interventions with fiscal and financial policies. Also tax and tariff rates were to be reduced in level and spread. Regional and sectoral selectivity like special concessions or exemptions were therefore to be rationalized. The objective would be to raise the aggregate growth rate, remove hindrances to business enterprises and expect the benign role of the market to also trigger growth in backward regions.

In the Nineties there was higher growth in crops which grew in the rainfed regions as the former Green Revolution States showed growth fatigue. But overall growth in agriculture fell. Hence inspite of faster growth in rice as compared to wheat, the poorer regions did not do very well. This was accentuated by a distinct anti grain bias in economic and technology policy which hurt the growth prospects of the poor predominantly rice growing regions. Also oilseeds, the main crop into which farmers diversified in these regions, suffered on account of large imports with low tariffs. Successful diversification into oilseeds in the Eighties in backward regions, particularly in the Central and Eastern region suffered. Raw Cotton is not a big crop in the East but it is there in Central India and large imports again led to shrinkage in area in the dry poor areas of the Deccan.

Profitability declines in agriculture in this phase hurt poorer regions more. The withdrawal of the State in terms of falling agricultural public capital formation curtailed growth and private investment did not make up the lag. Towards the end of the last decade, private investment in agriculture also stagnated. However in the last two years or so there has been a fragile turn around, which must be consolidated and strengthened.

The introduction of the EGS could if properly implemented improve the development of soil and water infrastructure in the dry and rainfed poor agricultural regions and this would be an important step forward. But to make this happen the institutional system will need great attention. The improvement in credit supply and reduction in the bank interest rate for agriculture in the Union budget 06 will improve the profitability of nascent commercial farming in the largely subsistence agriculture in Central and Eastern India.

But the region could grow much faster if monetary and tariff policies improved the profitability of the crops it grows. Also the recent emphasis on technological support could be a boon if profitability of farming improves.

Main Deaccelerators

There was decline in public investment on irrigation since the early 1980s. Agricultural profitability has fallen by 14.2 per cent through the decade of economic reforms. Earlier agricultural fixed capital formation in the private sector was rising, although it had collapsed in the public sector. But in the last few years, private sector investment in agriculture had collapsed, although there is some revival in public investment. (See Planning Commission, 2005, pp.; for earlier versions Alagh, 2003, 2004). There was a decline in the annual growth rate of fertilizer use from 7.8 per cent during the 1980s to 4.3 per cent during the 1990s due to increasing fertilizer prices. The first half of the Nineties was a period of explosive growth of agricultural trade. Import growth exceeded export growth. In the second half, substantial import growth continued. Exports collapsed. There has been some turn around in recent years. Fortunately there has been some improvement in the last two years. The global agricultural cycle seems to have turned. Commodity demand is improving and crops like cotton and some other cash crops are showing buoyancy. There have been unmistakable trends in recovery of fertilizer demand from 2004-05 onwards when the demand grew over the previous year by 4.5%. Policy concerns with respect to agriculture, particularly with rural finance and technology may also have played a role. It is of very high importance to consolidate the positive trends and to build a sound foundation for the agricultural and rural economy in the Eleventh Plan.

Policy Biases against Grains

Within the context described above rice growth was higher as also was growth in the Eastern region. The rate of growth of the agricultural and allied sector decelerated during nineties and this trend continues during the post-2000 period. The argument is sometimes made that while food grains growth has decelerated, that of non-food grains and dairying, etc., has improved. This is not true as shown by the growth of the more inclusive agricultural and allied sector.

- **Growth of Agricultural GDP at 1993/94 prices**

Period	Annual Compound Growth Rate
(1980-81 to 1989-90)	3.10
(1990-91 to 1999-2000)	2.95
(2000-01 to 2004-05)	1.37
(Triennium averages)	

Rice was growing faster than wheat and this was being sourced also in poorer regions.

Comparing the period 1975/00 with 1950/75, it has been stated for rice that:

"Growth of rice production (Table 3b) increased more than double annually in the second period as compared to the first. (1.92 million tones annual in the period 1975/76 to 1999/00 as against 0.88 million tons annual in the period 1950/51 to 1975/76) The first period had a greater increase in area, 0.36 million hectares per year as compared to 0.22 million hectares per year in the second. Interestingly, while overall area growth in grains was negative in the second period, in rice it was positive, although lower than in the first period." (Munish Alagh, 2006), and again for wheat;

"Wheat was the crop in which the Green Revolution began. Area doubles in the first phase (Table 4a) Area growth in the second phase is lower. It was as we saw higher in rice in that phase. Rice was the crop of the second phase. Output goes up by four times in the first phase and then growth is less. ... Area growth in the first phase was over 6% annual and falls sharply in the second phase. The annual yield increase in the second phase is impressive, although the yield growth rate goes down. Wheat is definitely the crop of the late Sixties and Seventies, just as rice is of the second period i.e., 1975-76/99-00." (M. Alagh, 2006)

Assam, Bihar, M.P., U.P., W. Bengal and Orissa show higher growth rates in rice than the national average in the Nineties.

I have always believed that diversification into non-grains and improved productivity of grain farming are two sides of the same coin and one or the other can be ignored only at peril. The Congress President Ms. Sonia Gandhi had asked me to give a presentation to the Chief Ministers of the Congress ruled States at their conclave in Mount Abu in Nov.2002. I had argued then;

> "It will be a mistake to ignore the strengths built up in the foodgrains area. In my Interim Report to WTO adjustment in the Punjab I have argued for a Commodity Board to ride through the global grain price cycle and technological support to the sector. In the final report I will document this with more facts and analysis. The new technologies in cereals like the bajra which can store, paddy, including the Hybrids must get off the research success stage. States like Punjab, Harayana, and Western UP will show the way, but if price policy gives appropriate incentives for quality and transport differentials are introduced, the rice economy in MP, Chattisgarh and speciality cereals like the Durhams will revive. Shorter duration cereals will pave the way for diversification to oilseeds, pulses, fruits and vegetables. Markets and their development and processing are the key. Strategic alliances must be encouraged. The Companies Second Amendment Bill, 2002, for coops must pass.
>
> A bifocal policy initiative is required. Subsidies with adverse consequences on productivity of land must be phased out. Simultaneously profitability of alternate crops and activities must improve through market, economic and financial reform. This is again the road map for each crop. If this approach fails, the Sate must intervene in markets. The role of sponsoring policies for alternative distribution channels so that there is genuine competition in input supplies is very necessary. Cooperatives, non-profit organisations and partnerships between private sector,

Coops, NGOs or local governments are required. A Committee has presented a draft law for cooperatives to set up producer companies with corporate alliances. It saved the cooperative principle by providing the one share one vote basis. The Independent Cooperative Initiative supported this in the Anand Declaration in December 2000. The concerned legislation has been tabled in Parliament and has been approved by the Standing Committee. Producer cooperatives, working on a cooperative principle can be a very powerful instrument of growth and the required level of diversification. Producers groups should be encouraged to enter into strategic alliances, say with the Corporate sector for Contract Farming." (Y.K.Alagh, in Bibek Debroy and P.D.Kaushik, ed., 2005, pp.42-43).

This advice was not always liked. (I learnt later from a press report that this aspect of my Abu presentation had raised controversy, although at the meeting apart from a question by a high level economist functionary of the party, there was no comment. For the press report See, Daily Telegraph, Nov.10, 2002). More recently the priority is only on non-grain or non-crop based agriculture.

1. By now the neglect of grains is having serious consequences. India's granaries are empty. This is the result of faulty policies over a decade and a half. It makes economic sense to reverse these policies and support the rice and wheat farmer as also the oilseed farmer in the recent Rabi, forthcoming summer and kharif paddy crops and later. This is particularly so since after a long time Government will be importing expensive grain. As compared to the MSP of Rs.6.40/kg., the landed cost of imported wheat is Rs.7.90/kg., involving large welfare losses from Indian farmers to Australian farmers, without any benefits for Indian consumers and an increase in the revenue and fiscal deficits. (See Krugman and Obstfeldt,2000, pp.198-199 for the theoretical basis in open economy macro-economics for these statements). Rice and mustard and rye are also the crops of backward States. If the ideological blinkers against grain farming are removed a policy response could for example, consist of steps like :

   a. Announcement of say a Rs.40 per quintal "transport" refund to farmers in deficit States for paddy procurement. (This would not cost the exchequer anything since that is the minimal transport cost of sending grain from the North to the "deficit" East and South):

   b. A Rs. 50 per quintal "quality" differential for the special varieties of rice grown in the different regions like the , the Assam Japonica varieties, etc. This would only reflect existing market differentials, be a market savvy policy and if strategically implemented would be revenue neutral:

   c. A fertilizer programme as spelt below.

   d. A Rajiv Gandhi Support programme for Hybrid Paddy Seeds; (These were discovered by a Special Technology Mission initiated personally by the late Rajiv Gandhi and after the seeds were developed tragically abandoned by successor Governments):

   e. China now covers over 5 million hectares under hybrid paddy. India has gone below 2 lakh hectares. The cost of the seeds has to be initially subsidized, since it

is produced by large companies which were involved in the research and breeder seed production; at least a million hectare target should be set for the Year 2006 and for a Year 2007 India should cross the target of 5 million under hybrid paddy already achieved in China. Definite steps should be outlined to achieve this.

2. To maximize wheat procurement a bonus of Rs. 30 per quintal should be announced, immediately and the transport "refund" and quality differentials announced simultaneously for the Rabi season 06/07 to give the farmer appropriate productivity signals.

Oilseed Farmers

a. A liberal purchase support programme for mustard-rye and groundnut production in the present rabi, the forthcoming summer and kharif should also be announced:

b. Government has recently announced a further cutback in tariffs on oilseeds, when more than half of India's oil requirements are imported. This must be reversed. (Government must implement policies of a strategic nature to support oilseed production and keep food prices in check).

Fertilisers

Considerable confusion has been created by different agencies of the Government planting stories in the press on fertilizer prices. Finance, Fertiliser, Agriculture and even the PMO, supposedly give views on the Working Group on Fertiliser Pricing. The Industry follows suit. Inspite of the Information Act nobody has bothered to release a summary of the original report. Most of the so called comments are factually wrong.

After a round of difficulty during last 2 years, demand for fertilizer is now rising at around 8%. It would be very inadvisable to reverse this trend by ill-considered policies of so called withdrawal of subsidies. If agricultural productivity has fallen as the CACP Data shows, there is no case for a radical revision in the supply price of fertilizer. Government should officially scotch rumors that fertilizer prices are being raised.

Direct subsidy to the farmer should initially be implemented in a few districts by the cooperative sector by fertilizer companies like IFFCO and KRIBHCO which are highly efficient.

Seeds Policy

A small empowered working group should be set up with powers at the highest level to develop such policies such that the farmer has access to the latest seed technology including bio- technology. The objective should be that in the Kharif Year 2006 there is no farmer who faces restrictions for using biotechnology.

The Govt. of India need to appreciate that out of the roughly 250 companies, which are registered with the Dept. of Bio Technology, only 7 are multinationals and the remaining are small Indian companies. The country has considerable comparative advantage in the technology field and if small companies can produce biotechnology at cheaper price legal methods have to be found to allow the country's farmers to have access to these technologies.

Government should set up a mechanism such that a farmer has access to seeds on a reasonable price at which they are made available .And more important, if quality standards for the seeds are not met farmers should have access to designated authorities so that they can get redressal from the seed companies. .In other word there should be protection to the farmers from seed companies in the event of problem seeds.

The Larger Context

Since output prices was not rising, fast enough, agricultural profitability rates was going down. It was earlier estimated that profitability rates in Indian agriculture have fallen by 15% in the Nineties (Y.K.Alagh.2003, 2006). The latest estimates are as follows;

S.No.	Period	Prices Paid for Intermediates	Output Prices
0	1.	2.	3.
1	1990/91	104.0	112.3
2.	2002/03	229.4	247.5
3.	% Change 1990/91-2002/03	120.6	120.4

Source: Computed from estimates given in CACP, 2005, Appendix II, p.276

The worsening of the profitability situation lamented earlier has been stemmed and this should lead to an improvement in capital formation in the private sector in the next phase.

Agricultural growth went down, because of a collapse of public investment. So we had both diminishing returns and cost push declines in profitability, in a period of substantial privatisation of agriculture. Since agricultural fixed capital formation in the private sector was rising, although it had collapsed in the public sector. I was in the earlier phase predicting that private investment in agriculture would go down. I was unfortunately for my country correct. In the last few years, private sector investment in agriculture collapses, although there is some revival in public investment. The fact are as follows and they show the fragility of investment in agriculture:

S.No.	Year	Gross Fixed Capital Formation	Public	Private
0.	1.	2.	3.	4.
1.	2001/02	46744	8529	38215
2.	2002/03	45867	7849	38018
3.	2003/04	47833	12809	35024
4.	2004/05	43123	12591	30532

Source: Economic Survey 2005/06, p.170

This is as I had argued earlier, an extremely serious matter and needs a well worked out policy response. I have argued elsewhere that this needs institutional response (Alagh, 2003). But all this has to be imbedded in a positive macro regime for the agricultural sector.

The 12th Finance Commission's report has further eroded the relative capacity of poor States to invest in infrastructure. As a recent study by the World Bank's Lead Economist concludes;

"Despite an expressed intention to make transfers more progressive, in fact the 12th FC seems to have made them less progressive, at least among the general category major States. Among these States, the four biggest gainers are the four richest States: Punjab, Gujarat, Haryana and Maharashtra. The average gainers are the poor States: UP, MP, Orissa, Bihar, and Rajasthan." (S. Howes and M.Prasad, 2005,p.1). Increased reliance on financial markets for borrowings has further eroded the capacity of poor States to finance agricultural infrastructure.

A Road Map for Crops

The strategy of laying out a road map for each of ten major crops was articulated by a Committee on agricultural pricing reform under the chairmanship of Y.K.Alagh and was announced by the FM in the last budget. The Alagh Committee had given the numbers for paddy policies. But only cut flowers have been covered. This is tragic and needs remedy. A roadmap for principal crops not based on historical costs but opportunity costs at the margin must be developed so that technological progress and India's competitive advantage such as bright sunshine and cheap labour are given a free reign to play.

A variant of the principle of Long Range Marginal Cost, adopted for the reform of industrial pricing in India and currently used for fertilizer pricing as recommended first by the CERC for power pricing, should be considered for analysis and development pricing and economic policies in the Road Map for agriculture. The farmer must be given incentives of pricing and non-pricing nature to internalize these costs in a transitional regime for a well defined and limited period. Higher level policies of support have to be implemented to meet the costs of a competitive agriculture in the medium term of three to five years.

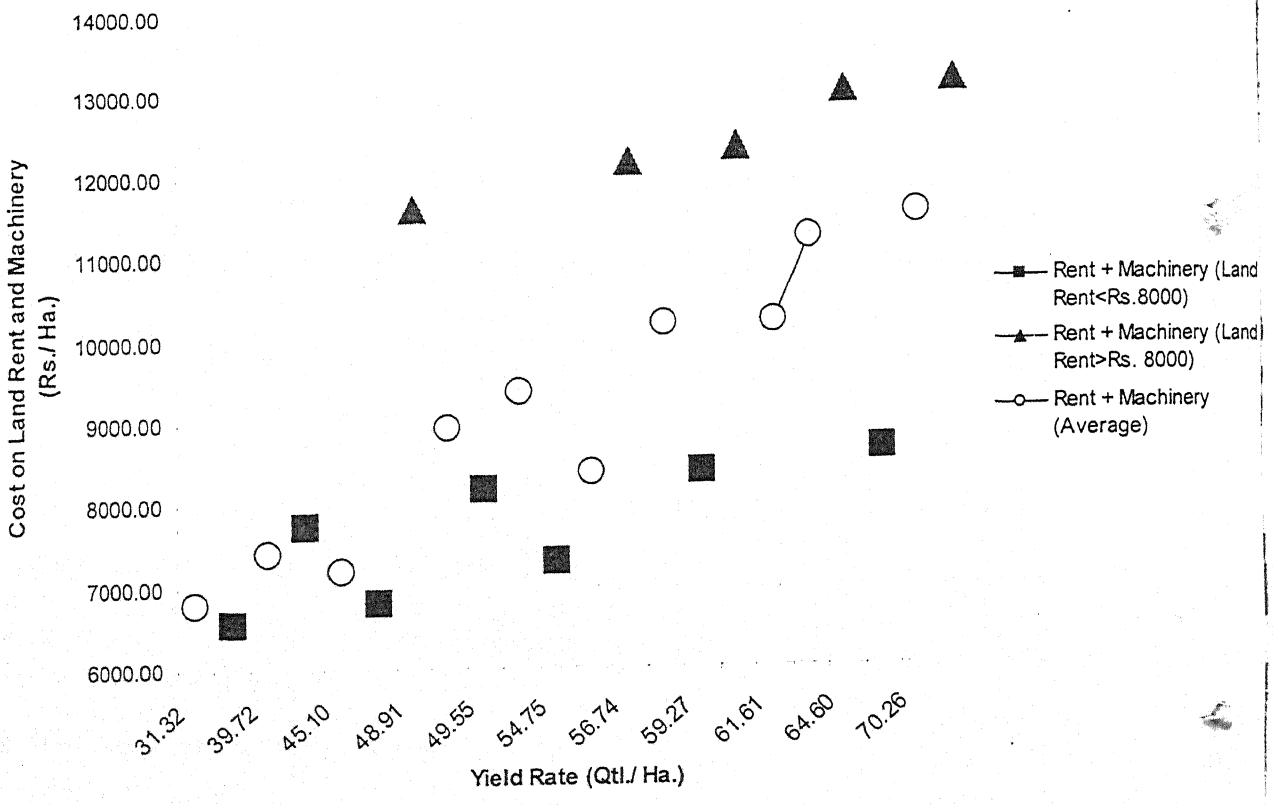
To make agriculturalist competitive, the farmer has to be supported in terms of the cost of production of efficient farming. These costs monetize existing practices, meet the immediate costs of technology adoption and learning and are sometimes embodied in new inputs. Many of them are of immediate kind and after an initial thrust and support, the farmer will compete on its own. The capital cost for such an economy at the margin would be higher than the historical costs. But current output costs would be lower per unit of output.

An Example

The average yield for the higher rent and machinery category of paddy farmers in Punjab was 57.5 quintals/hectare but for the lower rent and machinery category was 51.1 quintals/hectare for the year 2000-01. Cost of production per quintal for higher rent and machinery cost at the mean level was Rs. 431 per quintal, but for the low yield, low rent and machinery costs was Rs.391 per quintal. There is a ten per cent difference. If average costs of both kind of farmers are taken into account for price setting, the

competitive farmer will never get the incentives to expand and the low yield farmer to modernize and become competitive. Similar examples can be constructed for other crops.

Chart 6.5 : Yield vs. Cost of Land Rent and Machinery -Paddy-Punjab-2000-01



We need to develop a Road Map for each of the Major Crops which is WTO compatible and fill in the gap required by the "Efficiency Shifters" worked out by us. To make agriculturalist competitive, the farmer has to be supported in terms of the cost of production of efficient farming. Counterfactuals (Alagh, 2005) have shown that achievable targets in instruments like tarrifs, taxes, reduced effective interest rates and better marketing support can be integrated with pricing recommendations which are alternates with MSP increases. These should become the standard practice. This integration would be market friendly and WTO compatible in the sense that it would not show in AMS calculations and would serve the purpose of policy. For example Commodity exchanges should be promoted in various parts of the country and the NCDEX and other networks for informed analysis should be a policy instrument.

Regulating Imports and WTO Compatible Policies

The percentage of import of edible oils to domestic production was 95% in 2002-03. Natural cycle of 18 months in case of sugarcane crop, for instance, has been distorted by imports of sugar during the second half of the decade of nineties. Cotton imports of a sixth to a fifth of demand are seldom seen as a problem.
Oilseeds are arainfed region diversifier crop. The facts for edible oil imports are as follows;

Year	% of Import/ Production
1991-92	14.50
1992-93	21.96
1993-94	72.12
1994-95	06.27
1995-96	18.83
1996-97	22.94
1997-98	25.11
1998-99	44.59
1999-2000	84.71
2000-01	90.49
2001-02	75.02
2002-03	95.08

Name of items 04 applied Rate of Tariff	Bound Rate of Tariff
Soybean oil (crude)45%	45%
Soybean oil (refined)45%	45%
Crude Palm Oil65%	300%
RBD Palmolien and Refined Palm Oil75%	300%
Rapeseed / mustard oil (crude)75%	75%
Rapeseed / mustard oil (refined)75%	75%
Sunflower and safflower oil (crude)75%	300%
Sunflower and safflower oil (refined)85%	300%
Other edible oils including coconut oil (Crude)75%	300%
Other edible oils including coconut oil (refined)85%	300%
Oilseeds30%	100%

Non-timber forest products import duties should be rationalized. This will help States like Assam,Orissa,M.P.,Bihar, Chattisgarh, Jharkhand, and the North East and Karnataka and Kerala. A minimum customs duty of 40% should be imposed on many of these products, which are imported from countries like China.

Counterfactuals (Alagh, 2003, 2006) have shown that achievable targets in instruments like tarrifs, taxes, reduced effective interest rates and better marketing support can be integrated with pricing recommendations which are alternates with MSP increases. These should become the standard practice. This integration would be market friendly and WTO compatible in the sense that it would not show in AMS calculations and would serve the purpose of policy.

For example Commodity exchanges should be promoted in various parts of the country and the NCDEX and other networks for informed analysis should be a policy instrument.

The poor States must develop expertise to lobby for their case for tariff and monetary policies in a WTO dominated trade and liberalizing fiscal regime. It is increasingly being recognized that giving lectures on the efficiency of World markets, dismantling local structures and sitting back and waiting for global opportunities to bring about the millennia was perhaps never the only answer and would always be a part answer in an extremely imperfect global order. Experts like Ashok Gulati for long championed these mind sets and maintained the stance that the major problem was that the AMS was negative. He has now modified his position and is much closer to stands taken by local scholars (See Alagh, 2003 and A. Sen and M.S. Bhatia, 2004.).In a study released in May 2005, it is now stated that:

> "we report less disprotection of Indian agriculture in the 1990's than in earlier studies." (See K. Mullen, D. Orden and A. Gulati, IFFPRI, 2005).

Poor States have to appreciate that the context is going to be difficult for India and for them. It has to be recognized that;

- 1. India does not discriminate against agriculture as much as it did in the past.
- 2. In the case of rice and wheat a new playing field is there.
- 3. India subsidises agriculture in a big way. Indian subsidies will be up for discussion in the next round. The reform process will have to be WTO compatible (Y.K. Alagh, 2006)

Research Regimes

A very interesting aspect of the Indian experience is that Indian scientists have generally responded well to well structured science and technology initiatives. When the goals have been clear, and support mechanisms in terms of organizational strength and resources assured on a reasonable basis, performance has been excellent. Take an example. In 1989 when the policy of selective import of seeds was announced, Dr R S Paroda was able to get an assurance from the then Prime Minister Rajiv Gandhi that in selected crops, Indian agricultural scientists would get support for mission oriented projects. The successful development of Hybrid Paddy by Dr Siddique's Group was the result. Also for castor similar results were achieved. Many more are there. An area of strength with India is mission oriented research. But results on the field are different issues and progress in some cases is poor, like the spread of hybrid paddy or the mess in Bt cotton.

Hybrid paddy research was a successful example of a private-public partnership. But it failed as an organisational system. and its application has been a disaster. There is no coordination in spreading the technology .In Bt cotton the story is much worse. We have successfully created a system in which millions of farmers are so called "criminals" and the most preferred seeds are sold illegally.NavBharat seeds are sold at Rs. 450 a kg. The Monsanto variety at a premium of Rs.1250 (Sanat Mehta, Indian Express, 20 Nov.2005) Legal systems which were created to determine foolproof safety controls on genetically engineered seeds were used to look into productivity, cost or other commercial aspects which they were not meant to. The economic tests were supposed to be met by the market. Also there was no thinking on the relationship between the user groups, coops, farmer groups, etc., small technology companies in which India has strength and multi-nationals.

The kind of coordination mechanisms which were developed earlier and lead to the spread of the HYV technologies have been weakened and no new successful working models put in place. Private-public partnerships as the ADB has pointed out in its excellent volume on Vision of Asian Agriculture 2020, (ADB, 2001) need policy championing. Newer systems run into problems. If at high levels of policy making solution systems do not exist, the experiments fail. It is easy to break past systems. It is difficult to build new ones.

EGS, Land and Water

The argument that each agro-climatic region has its own solutions is well known and so I wont repeat it. Suffice it to say that a Framework Plan with targets, best practice cases, policies and threats anticipated exists, sadly on paper. (Planning Commission,1989, Alagh, 1991). Its developments have been professionally reviewed, (K. Chopra, CHH Rao and RP Sengupta, 2003). We always complained, but now one of the more experienced hands has called the Nineties the "Golden Decade" for watershed development, JFM's and Participatory Irrigation Management). Therefore:

> "When those working for Participatory management of natural resources were hoping for strengthening and carry forward participatory approach in 2000-2001 at the time of formulation of the Tenth Plan, there was severe setback as described in the paper "The Fading Shine of the Golden Decade." The paper, annexed to this report, is a cry of anguish. When this paper was presented to Dr. MS Swaminathan and Prof. YK Alagh, they encouraged DSC to organize national level deliberations to voice concern at the dilution and almost reversal of the participatory approach and at the same time present Principles that should guide the formulation and modification of schemes of NRM by center, states, or donors." (Anil Shah, Bopal 2005)

The Bopal Declaration emerged because stakeholder participation was diluted both in watersheds and in JFMs; the former in the Hariyali Guidelines and the latter in

departmental insrtructions (See the Bopal Declaration, 2005). It consists of Eight Principles for revival and Road Maps for each. These are;

Principle-1: Centrality of Community Based Organisations (CBOs)

Gram Sabha and as its executive committee the Gram Panchayat should be associated with stakeholders' organizations so as to secure required support for the development of local resources. CBOs will represent interest group of primary stakeholders and not be identified with Gram Panchayat. Gram Panchayat will provide enabling support to these interest group and not replace themt.

Principle – 2: Equity

At the design stage itself program must identify and account for losers and gainers or les gainers. Interventions in the form of differential contribution, customized village level institution building (e.g. gender segregated user-groups), non-negotiable budget provisions, gender-sensitive choice of technology and targeted delivery options are some of the approaches known to be more effective in reaching out to poorer sections. Therefore it is essential to always inquire while planning, monitoring and evaluating who are the losers, who are the 'less gainers' and how are non-gainers' access protected.

Principle – 3: Decentralisation

Flexibility in technical, social and financial norms to suit varying local conditions should be facilitated through a decentralized process, by a broad based organization at the district level. The district level organization must be led by a CEO who is competitively selected for a fixed term on a performance contract basis and is granted full autonomy to deliver results within the limits of the organization's charter, a Governing Board with strong representation from stakeholders and, multi-disciplinary professionals with high competency that can provide support for effective decision-making. Such an organization should provide continuity to administration in decision-making and also ensure timely release of funds as approved in the action plan of the project.

Principle - 4: Importance of facilitating agency.

Apart from Watershed programmes, other NRM programmes such as in Forestry and Irrigation do not have clear provisions for any role for such agencies. Under such circumstances, there is a tendency of CBOs to surrender their roles and responsibilities to public agencies.

Principle – 5 : Monitoring and Evaluation

These lessons have to be distilled from the field and made available to both policy makers and programme review body in a manner and time-span that it can be instrumental in improving programme policies and reforming or adopting improved procedures. When programmes are monitored in real-time and feedback is used for bringing reforms in the field, key functionaries are motivated to "embrace errors" and convert failures into learning opportunities.

Principle – 6: Training and software inputs

Principle – 7 : Sustained momentum of development

" Initiate productivity enhancement and value addition during the project period and for a few years beyond so that NRM programmes realize full potential of local resources resulting into rising income and prosperity for the rural communities

Principle 8: Organizational re-structuring

A re-launch of existing organizations for sustainable NRM is necessary to bring about change in the work culture towards greater pro-activity and responsiveness to the stakeholders. These organizations, at the national, regional, district, and local levels need to have much greater operating autonomy, and accountability for performance to their funders and for service delivery to the intended recipients. In many countries, including the U.K., Canada, and Malaysia, greater autonomy coupled with enhanced accountability of governmental service delivery organizations has generally yielded excellent results. In India, NDDB offers another example. Besides, after the pace of liberalization picked up in 1991, Government of India owned 240-odd enterprises have been put under a regime of enhanced autonomy, professionalism, and accountability. Their aggregate sales have quadrupled, while their net aggregate profits have increased about ten times. In contrast, the 750-odd enterprises owned by the states, still headed by politicians and bureaucrats with frequently short tenures, have been increasing their aggregate losses by about 17% per annum compounded.

Global experience with public sector organizations indicates that several mechanisms of autonomy and accountability need to be institutionalized for excellence. These include a charter for the organization that clearly spells out its mission, mandate, powers, responsibilities, and autonomy; a competitively selected CEO on a (renewable) contract appointment with considerable operating autonomy though within the organization's charter; a governance board with strong representation of the organization's stakeholders and relevant professionals; an annual MoU that spells out the performance expectations for the organization and support expectations for the institution to which the organization reports; an MIS that periodically reports to the stakeholders and the controlling institution progress vis-à-vis performance targets as well as other developments; a charter of services that the stakeholders can expect from the organization and a mechanism to redress grievances should they arise; transparent, merit-oriented human resource management policies (vis-à-vis hiring, emoluments, promotion, etc.); performance linked rewards; 'best value for money' market tests for the services offered, etc.

NRM programmes require relatively highly autonomous organizations at district, state and national level with performance accountability, accountability for service delivery to their stakeholders, and multi-disciplinary competencies, to enable them to design, modify, operationalize, and implement as appropriate the NRM programmes within their respective mandates. At the national level, this organization will take the form of a Board for each major programme. To facilitate excellent contribution to their respective missions, each of them must have a charter that clearly spells out its mandate, mission, powers, responsibilities etc., a CEO who is competitively selected for a fixed term on a performance contract basis and is granted full autonomy to deliver results within the limits of the organization's charter, a governance board with strong representation from stakeholders and relevant professionals; an annual MoU between the organization and its controlling/funding authority that sets out performance and support expectations on both

sides; a management information system (MIS) that provides periodic information on the organization's performance against its MoU commitments to its controlling authority and its stakeholders; a stakeholders' charter that sets out what services the stakeholders can expect from the organization and the mechanism for redressing any grievances they may have; transparent HRM policies; performance-linked rewards; and 'best value for money' market tests.

The relevance of all of this to backward areas with serious real resource use problems is obvious. I will only highlight two Principles The first is let us forget about the past. We have strong support and must lobby at Delhi with the Planning Commission and others. The Mid term Appraisal sets the right tone and the PM has in his Independence Day address opted for an Authority For Rainfed Regions. Indira Gandhi started the quest for self reliance in foodgrains in 1975 from the Red Fort, Rajiv Gandhi was the forerunner of agro-climatic planning, the origin of the "second green revolution' again in 1986 from there and so the authors of the Bopal Declaration hope for the best. If the New Authority is set up in earnest the beginning of the battle is won. The second is that the seventh principle since it is new. Watershed Plus says that CBO's have to take the community to the market to take advantage of value addition and prices. This is an addition to the concept box and not easy. It took me quite some time to convince my friend Harnath Jagawat for example that his adivasi girls and boys will have to sell produce for profit, after successfully running lift irrigation cooperatives. For a land and water developer this is a new ball park and needs an effort.

Are there Alternatives to CBOs, Coops and Producer Associations ?

The only alternative model which I know which is seriously suggestted is Tushaar Shah's plea that the Chinese experiments in private sector institutions at the village level to run water systems should be the preferred model. Incidentally his model also includes a strong system upstream say upto the distributory as we would call it. Also I think he is underestimating the role of the Communist party in directing public-private partnerships in China. My impression after field visits in regions similar to the ones he worked leading a Rajiv Gandhi Foundation delegation in October 2004, is that the local agents are carefully selected and are responsible to higher authorities. It is not an accident that The Mayors of Shanghai go to Beijing at the highest levels.

My view is it is early hours yet and the mixtures of public and private initiatives in strategic organizations is an issue with experimental possibilities. The question of the organization of small farmers and their links with higher level organizations like input supplying or selling companies, or irrigation systems, is a complex one. Possibility of small farmers to form their own companies, without loss of control on their land, now exists under the law and needs to be explored. Later on, they may be allowed to have joint ventures with big companies, if they so decide. A problem visualized in contract farming is the organization of farmer groups to interact with large companies. One answer is to encourage farmers groups in this context. According to a recent review of such issues by Samar Dutta.:

"Even though several states have introduced parallel cooperative laws, and even though the union law, too, has been made more liberal, yet the pace of reform has been far too slow. Several states have resisted all effort at reform. Farmers in Gujarat, Maharashtra, Tamil Nadu, West Bengal, Punjab, and several other states continue to have few options. Under these circumstances, a new chapter on producer companies was introduced in 2002, to the Companies Act. This legislation was based on a draft produced by a Committee under the Chairmanship of Y.K. Alagh. (Y.K. Alagh, 2000) The attempt was to draft the chapter to enable farmers and other primary producers to set up companies, which resembled cooperatives as closely as possible. Where profits in companies is normally shared on the basis of share holding, producer companies can distribute profits based on patronage of services. Where other companies with several shareholders have to list their shares in the stock market, producer companies do not. Voting rights in producer companies where individuals are members, is on the basis of one member, one vote. However, where institutions are members, voting right is based on patronage of business transacted with the federation. While it is possible for a producer company to wind up its affairs, the registrar of Companies has the right to "strike off" the name of the company, if he/she does not believe it to be based on mutual assistance among members." (as quoted in Alagh, 2004)

The Producers Company legislation now on the statute book provides an important method of strengthening farmer groups to take advantage of strategic alliances for growth, following the cooperative principle. Social Engineering in backward areas is a possibility to look at seriously. The integration of EGS with the problem of strengthening the resource base of agriculture in poor areas is obvious.

References

ADB, 2000, Rural Asia: Beyond the Green Revolution, Manila, ADB.

ADB, 2000 Rural Asia: Companian Volumes (I-III), Oxford, University Press.

Alagh, Munish,2006, Indian Agriculture: Growth and Change, forthcoming, Agricultural Situation Of India

…….. and Yoginder K. Alagh, 2003, Trends in Crop Diversification:Need For A Policy Shift, Agricultural Situation of India, Special Number, October.

Alagh, Y.K., 2000, Report of the High Level Committee on Legislation for Corporatisation of Cooperatives, New Delhi, Ministry of Company Affairs

--------., 2002a, Emerging Institutions and Organisations: Some Aspects of Sustainable Rural Development, reproduced in in G.C. Malhotra (Ed.), Fifty Years of Indian Parliament, New Delhi, Lok Sabha Secratariat, 2002, pp.491-504

----------, 2003, Agricultural Price Policy in An Open Economy, Tenth Dharam Narain Lecture, Delhi School of Economics and Institute of Economic Growth.

....., (2004), "State of the Indian Farmers: A Millennium Study, An Overview", Academic Foundation, New Delhi.

....., 2005, Agriculture and Rural Development; Towards A Policy Framework, in B.Debroy and P.D. Kaushik, ed., below, pp.35-48

-------, 2006, Indian Economic Strategies After Doha, in R.Radhakrishna, et.al., ed., India in A Globalising World; below, Ch.7, pp.205-232, earlier version in Seminar on the Ideas Institutional Nexus, CIGI and UNU, Buenos Aires.

Alexandratos, Nikos, 1995 ,World Agriculture Towards 2010, An FAO Study, Chichister, Wiley.

Development Support Center, 2005, The Bopal Declaration, Bopal
Debroy, B., and P.D.Kaushik, ed., Energising Rural Development through Panchayats, New Delhi, Academic Foundation and Rajiv Gandhi Institute of Contemporary Studies.

F.A.O. , 1993, Agriculture Towards 2010, Rome, F.A.O., for final published version see, N. Alexandratos.

Government of India,1989, AgroClimatic Planning : An Overview, New Delhi, Planning Commision (authorship, Y.K.Alagh, et.al.)

----------,2001, Ministry of Commerce and Industry, WTO:Agreement on Agriculture: India's Proposals, New Delhi

....., 2005,Report of the Commission on Agricultural Costs and Prices for the Season 2004, Delhi,

Gulati., A., and A. Sharma, 1994, Agriculture under GATTS: What it Holds for India, Economic and Political Weekly, July 16, p. 1861.

Howes, S.,and M.Prasad,2005, Reforms to the Federal Transfer and Grant Regime Proposed by the Twelfth Finance Commission, Delhi, World Bank, Draft.

Krugman, P., and M. Obstfeld, 2000, International Economics: Theory and Policy, New York, Addison Wesley

Nayyar D., and Sen, A., 1994, International Trade and Agricultural Sector, in G.S. Bhalla, ed., Economic Liberalisation and Indian Agriculture, New Delhi, ISId, pp.61-106.

Planning Commission, 2005, Mid-Term Appraisal of Tenth Five Year Plan,2002/2007, Manager of Publications, Government of India, New Delhi

Purcell, D., DRC Estimates widely used by World Bank, for example, See, World Bank, An Industrialising Economy in Transition, Washington, 1989.

Radhakrishna, R., S.K.Rao, S.Mahendra Dev, and K.Subbarao, 2006, India in A Globalising World: Some Aspects of Macroeconomy, Agriculture and Poverty , Delhi, Academic,

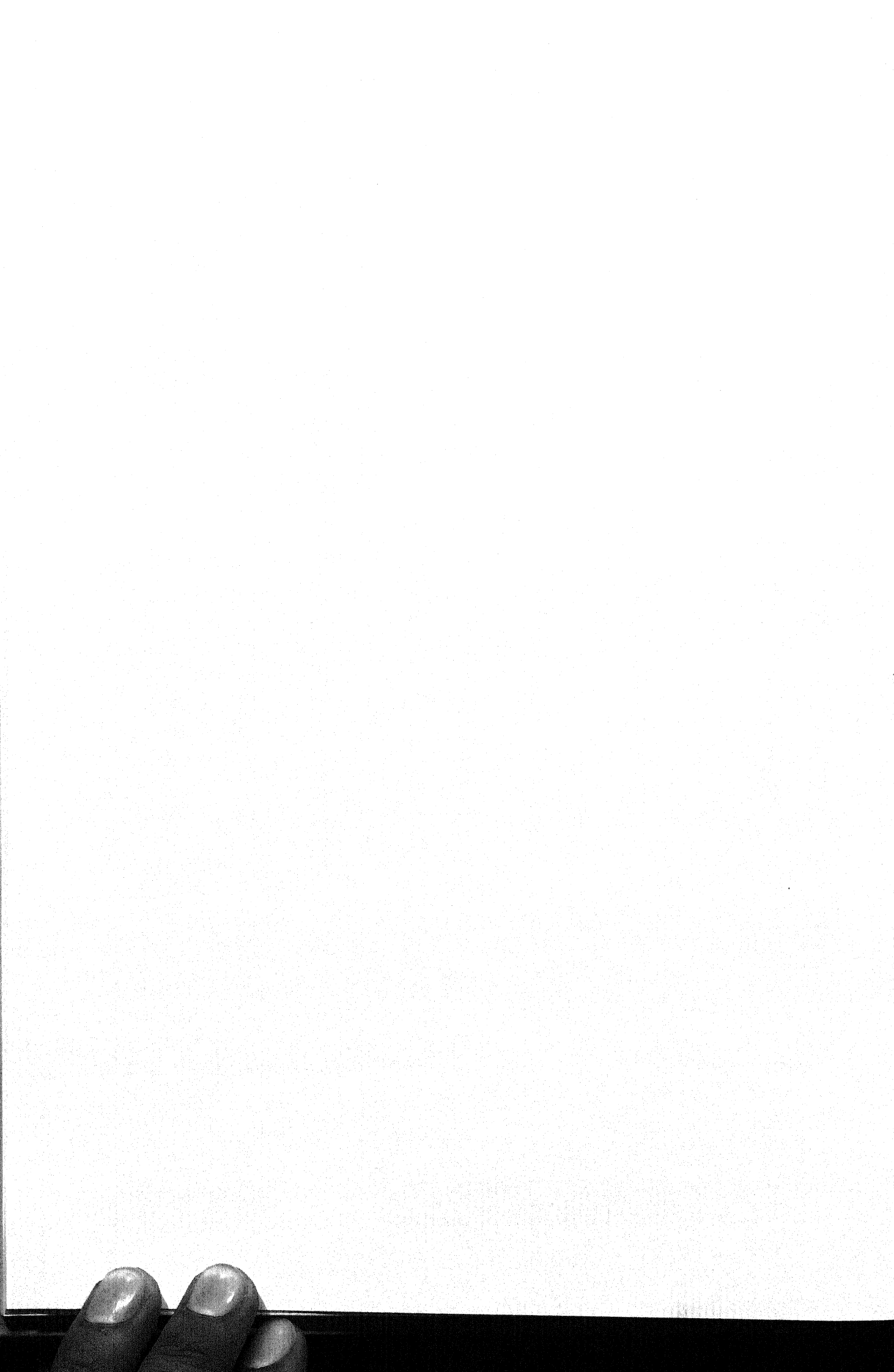
Sen, Abhijit and Bhatia, M.S. (2004), "State of the Indian Farmers: A Millennium Study, Cost of Cultivation and Farm Income", Academic Foundation, New Delhi..

Seminar on
Agricultural Growth in the Post Reform Period: Regional Perspectives

Keynote Address
by

G.S.Bhalla
Professor Emeritus
Jawaharlal Nehru University, New Delhi

Giri Institute of Development Studies
Lucknow
March 27-29, 2006



Agricultural Growth and Regional Perspectives

I. Agricultural Growth at the National Level

- Trends in Growth of GDP and Deceleration of Agr Growth during the 1990's
- Trends in Growth of Crop Output & Slow Down
- Agricultural Export Boom and Bust
- Stagnant Terms of Trade
- Decline of Investment in Agriculture & Collapse of Public Investment

II. Agricultural Growth Regional Perspectives

- Regional Variations in Growth of GDP and Output
- Regional Variations in Crop Diversification
- Regional Variations in Per worker Productivity in Agriculture

Growth of GDP and Major Sectors

At 1993-94 prices

	1951/52-1980/81	1981/82-1990/91	1990/91-2000/01	1992/93-1996/97	1997/98-2001/02	2002/03
GDP	3.5	5.6	6.1	6.7	5.5	4.0
Agriculture	2.5	3.6	3.3	4.7	1.9	-5.2
Industry	5.3	7.1	6.6	7.6	4.5	6.4
Services	4.5	6.7	8.0	7.6	8.1	7.1
Per Capita Income	1.40	3.01	4.30	5.09	3.66	1.8

Source: National Accounts Statistics, 2004.

All India Compound Growth Rates of Area Production and Yield of Major Crops

Crop	1949-50 to 1964-65			1967-68 to 1980-81			1980-81 to 1990-91			1990-91 to 2003-04		
	Area	Prod	Yield	Area	Prod	Yield	Area	Prod	Yield	Area	Prod	Yield
Rice	1.21	3.5	2.25	0.77	2.22	1.46	0.40	3.56	3.47	0.15	1.14	0.99
Wheat	2.69	3.96	1.27	2.94	5.65	2.62	0.46	3.57	3.10	0.74	2.13	1.35
Coarse Ce	0.90	2.25	1.23	-1.03	0.67	1.64	-1.34	0.40	1.62	-1.58	0.25	1.87
T..Cereals	1.25	3.21	1.77	0.37	2.61	1.70	-0.26	3.03	2.90	-0.25	1.32	1.58
T. Pulses	1.72	1.41	-0.18	0.44	-0.4	-0.67	-0.09	1.52	1.61	-0.87	-0.74	0.16
Foodgrai	1.35	2.82	1.36	0.38	2.15	1.33	-0.23	2.85	2.74	-0.44	1.16	1.11
Sugarcan	3.28	4.26	0.95	1.78	2.6	0.8	1.44	2.70	1.24	1.41	1.22	-0.16
Oilseeds	2.67	3.2	0.3	0.26	0.98	0.68	1.51	5.20	2.43	-1.07	0.18	1.26
Cotton	2.47	4.55	2.04	0.07	2.61	2.54	-1.25	2.80	4.10	0.82	0.15	-0.69
NonFood	2.44	3.74	0.89	0.94	2.26	1.19	1.12	3.77	2.31	-0.09	1.20	0.62
All Crops	1.58	3.15	1.21	0.51	2.19	1.28	0.10	3.19	2.56	-0.25	1.58	0.90

Fig 5.7

Growth rate of Output

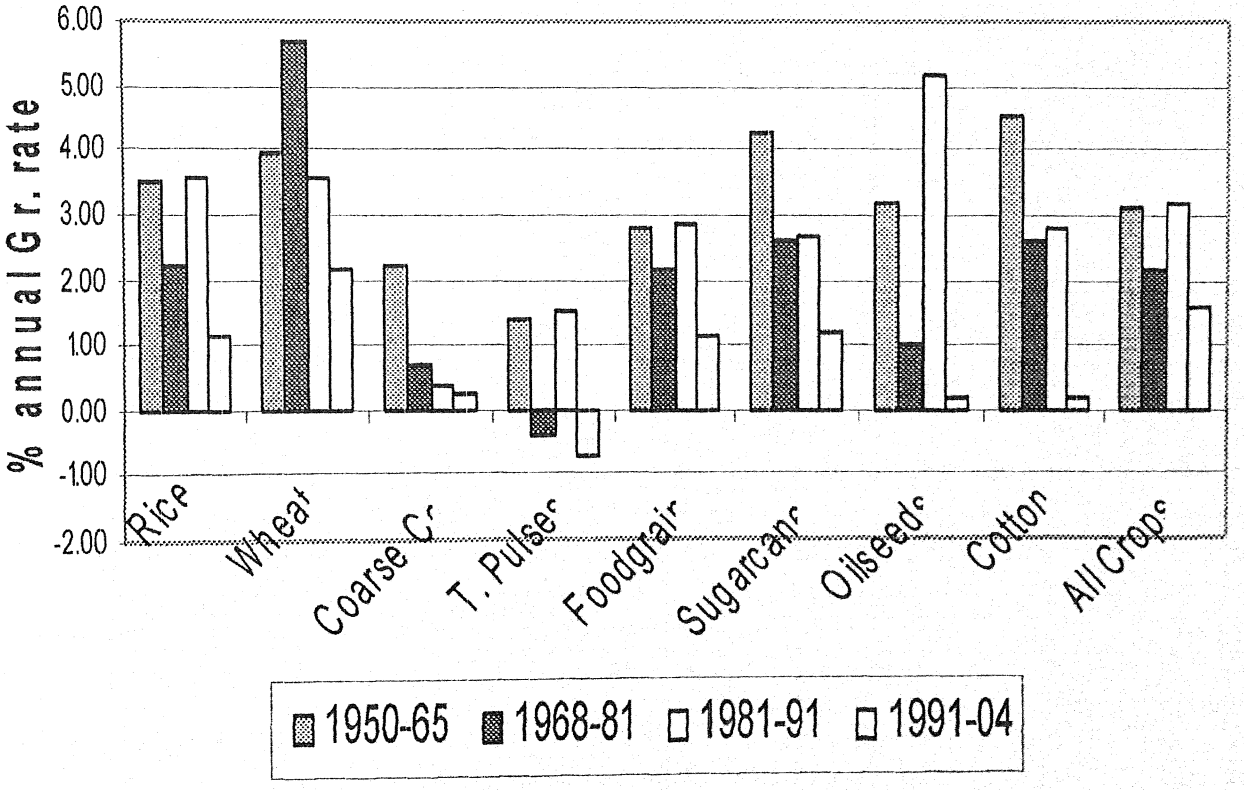
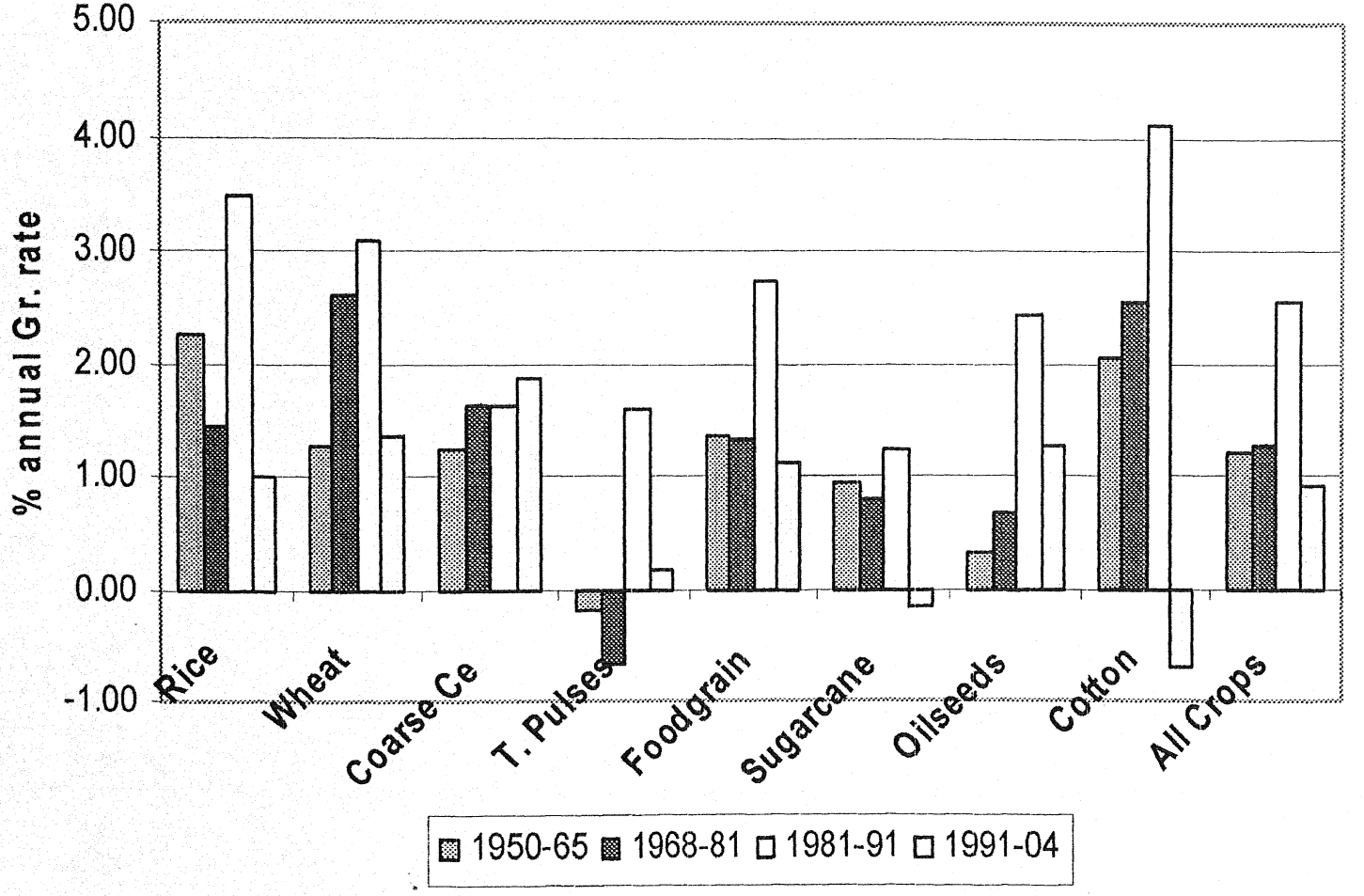


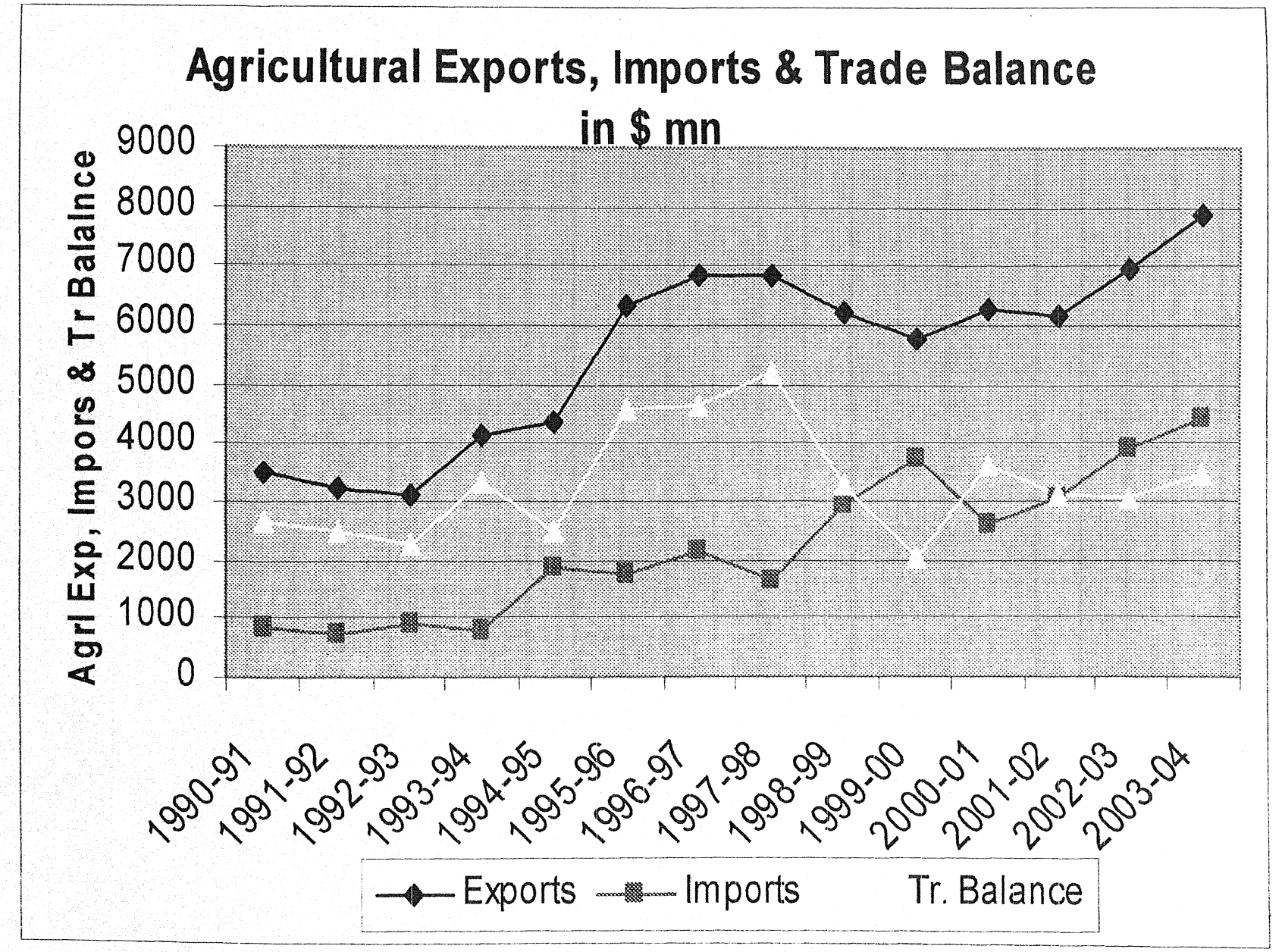
Fig 5.5
Growth Rate of Yield



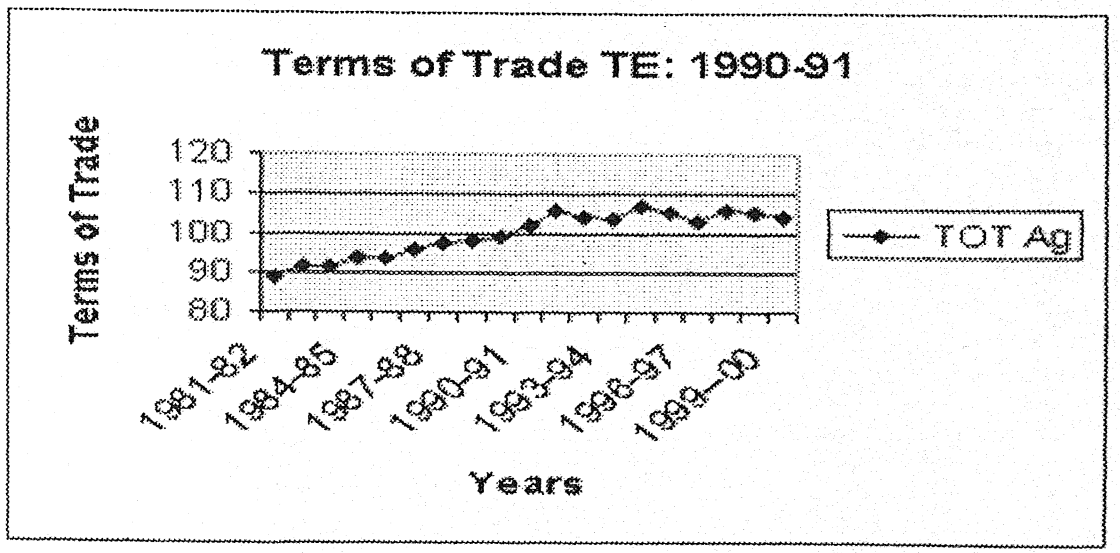
Agricultural Exports & Imports India, 1990-91 to 2004-05

	Total exports	Agrl exports	Agrl Exp % Total Exp	Coffee	Tea	Oilcakes	Cotton	Rice Total	Fish
1960-61	1348	596	44.21	15	260	29	25	0	10
1970-71	2031	644	31.71	33	196	73	19	7	40
1980-81	8484.7	2600	30.64	271	538	158	209	283	274
1991-92	17865.4	3202.5	17.93	135	491	374	124	306	585
1996-97	33469.7	6862.7	20.50	402	894	985	444	894	1129
2001-02	43827	6146	14.03	230	360	475	9	666	1236
2002-03	52719	6962	13.21	205	344	382	10	1205	1432
2004-05	78205	8002	11.90	224	397	690		1478	1267
% Annual Compound Growth Rate[1]									
1971 to 1981		17.92		23.42	10.62	8.03	27.10	44.77	21.23
1981 to 1991	6.73	2.24		-1.46**	-0.25**	9.72	0.60**	-0.46**	5.03
1991 to 2004	11.60	8.78		4.27**	-2.73**	0.48**	-14.66	10.69	7.32

st liberalization period have been calculated on the assumption that the dollar prices have remained constant during that period. Although US $ had maintaine

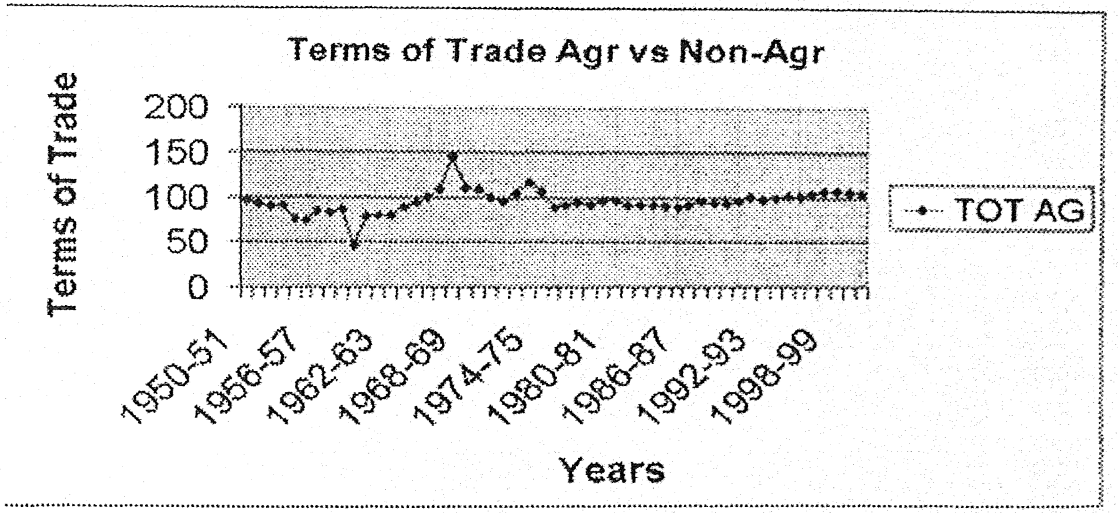

Agricultural Exports, Imports & Trade Balance
in $ mn
Agrl Exp, Impors & Tr Balalnce
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
Exports
Imports
Tr. Balance

Terms of Trade Prices Received and Paid, DES

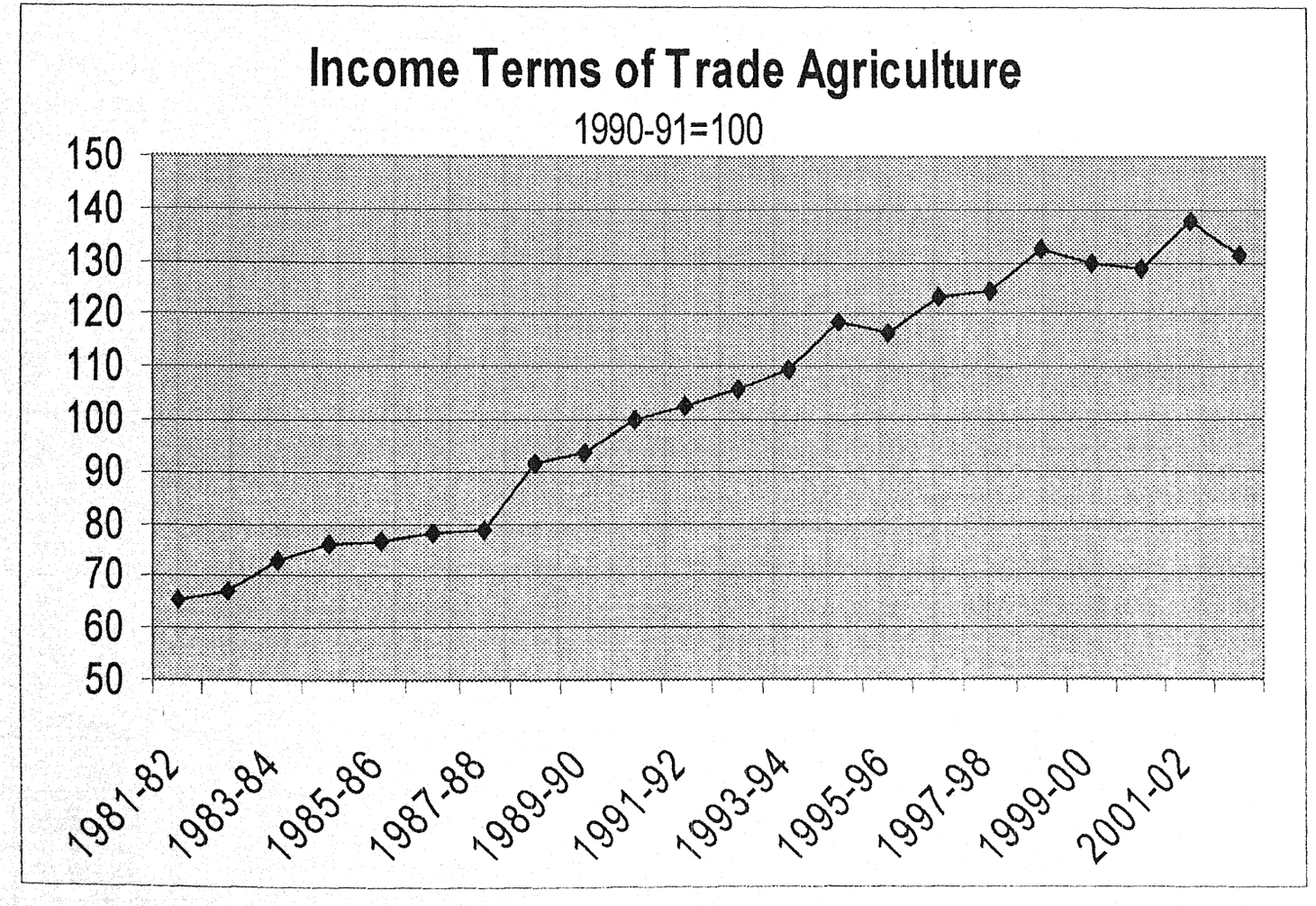


Source: CACP, 2002

Terms of Trade –GDP Deflators



Source: Calculated by the author from National Income and NSS data


Income Terms of Trade Agriculture
1990-91=100
150
140
130
120
110
100
90
80
70
60
50
1981-82
1983-84
1985-86
1987-88
1989-90
1991-92
1993-94
1995-96
1997-98
1999-00
2001-02

Public and Private Investment in Agriculture

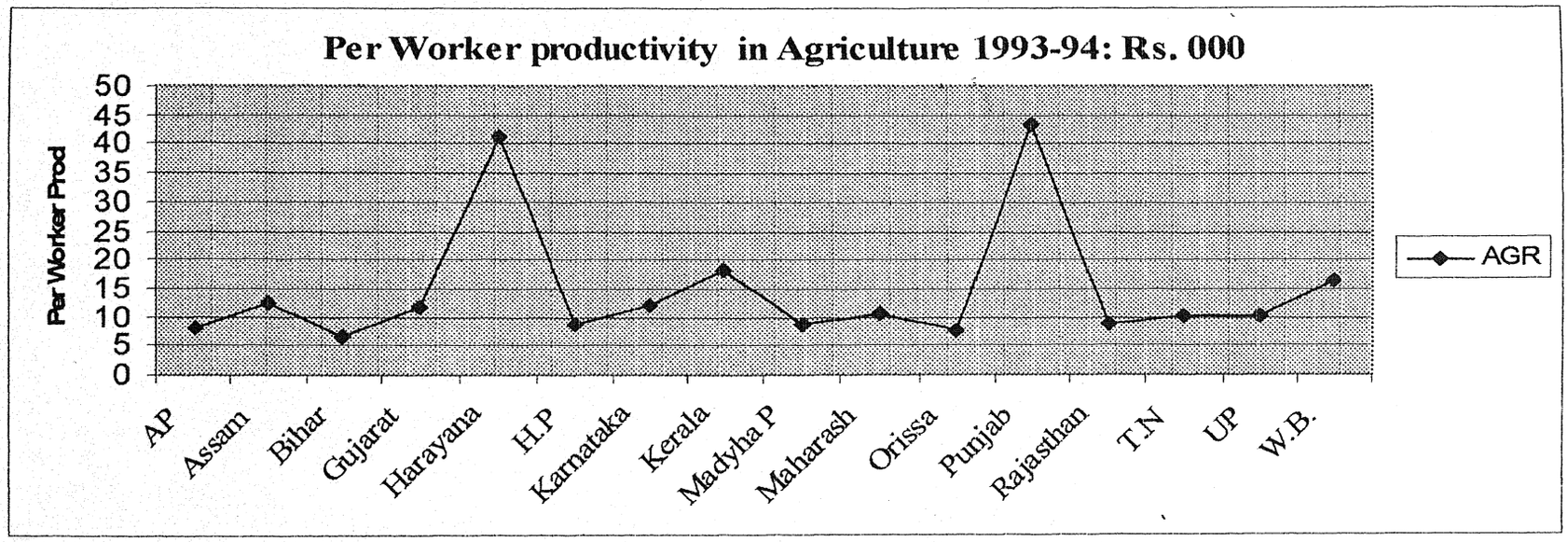
Year	Total	Public	Private	% Share Pub	% Share Prive	Tot GCF in Agr % Tot GDP	Tot.GCF in Agri as % GDP Agri
(At 1980-81 Prices)							
1960-61	1668	589	1079	35.3	64.7	2.7	5.1
1970-71	2758	789	1969	28.6	71.4	3.1	6.7
1980-81	4636	1796	2840	38.7	61.3	3.8	9.9
(At 1993-94 Prices)							
1990-91	14836	4395	10441	29.6	70.4	1.9	6.6
1995-96	15690	4848	10842	30.9	69.1	1.6	6.2
1996-97	16176	4668	11508	28.9	71.7	1.5	5.9
1997-98	15942	3979	11963	24.9	75.1	1.4	5.9
1998-99	14895	3870	11025	26	74	1.3	5.2
1999-00	17304	4221	13083	24.4	75.6	1.4	6
(At 999-00 Prices)							
1999-00	43473	7754	35719	17.8	82.2	2.2	8.8
2000-01	38176	7018	31158	18.4	81.6	1.9	7.7
2001-02	46744	8529	38215	18.2	81.6	2.2	8.9
2002-03	45867	7849	38018	17.1	82.9	2.1	9.2
2003-04	47833	12809	35024	26.8	73.2	2.0	9.8
2004-05*	43123	12591	30532	29.2	70.8	1.7	7.8

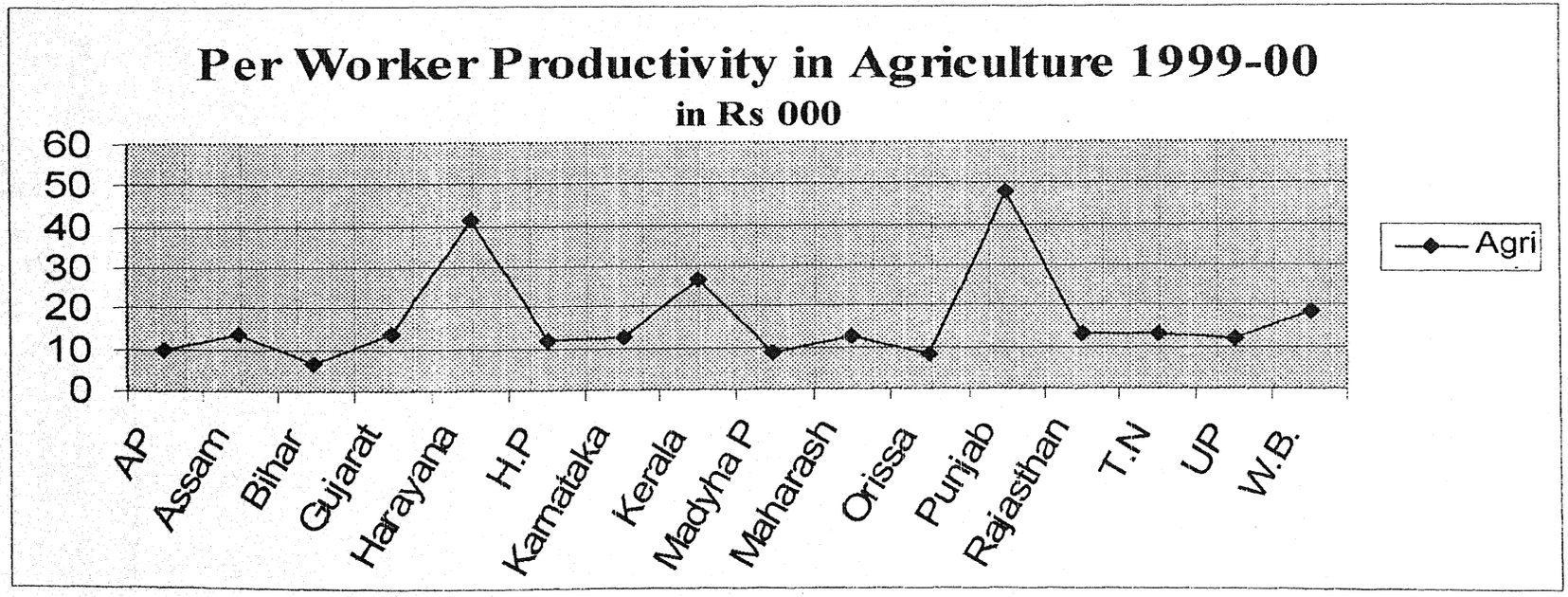
State wise Growth of Agriculture & Per Cap Income

	% pa G R 1983-84-1993-94		% pa GR 1993-94 - 2003-04	
	At 1980-81 Prices		At 1993-94 Prices	
	Agricult	PCY	Agricult	PCY
AP	3.05	2.42	2.8	4.5
Assam	2.12	1.25	0.51	1.47
Bihar	-0.45***	1.98	2.5	2.74
Gujrat	0.84***	3.11	1.13***	4.08
Haryana	4.86	3.66	1.77	3.46
HP	3.08	3.94	1.3	4.74
Karnataka	3.54	3.99	3.12	5.48
Kerala	4.4	3.94	-2.00*	3.99
MP	2.82*	2.73	0.23***	1.97
Maharasht	5.39*	5.2	1.27	2.96
Orissa	-0.57***	1.51	0.17***	2.55
Punjab	4.62	3.11	2.15	2.44
Rajasthan	3.93	3.71	1.21***	2.69
T. Nadu	4.43	6.1	-0.60***	4.06
UP	2.8	2.61	2.18	1.44
W.B	4.45	2.47	3.45	5.46
India	3.05	3.5	2.19	4.16
C V	58.72	39.49	102.88	40.24

Per Worker Productivity in Agriculture, 1993-94 & 1999-00

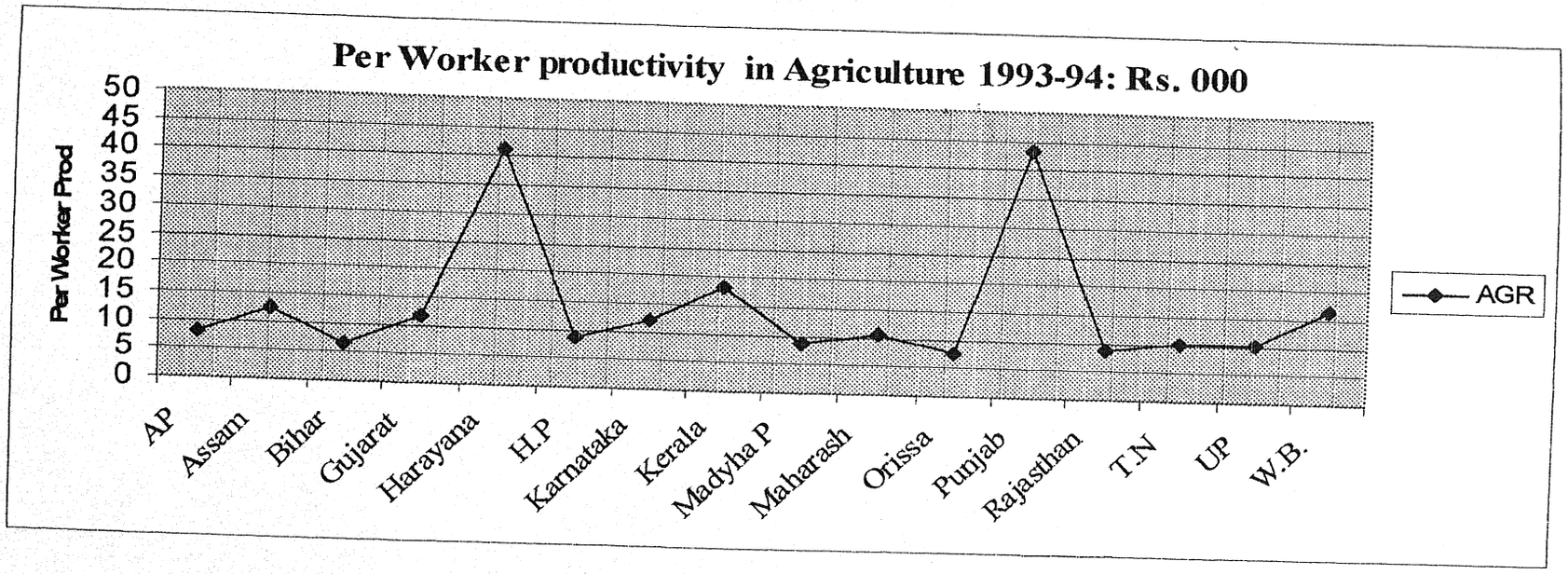
UPSS	Per worker Productivity (in Rupees)		Growth Rate	Poverty ratio	
State	1993-94	1999-00	% Annual	1993-94	1999-00
A P	7,972	9,103	2.24	15.92	11.05
Assam	10,461	11,727	1.92	45.01	40.04
Bihar	5,413	4,634	-2.56	58.21	44.3
Gujarat	9,774	9,106	-1.17	22.18	13.17
Haryana	25,362	28,695	2.08	28.02	8.27
H P	6,960	7,792	1.90	30.34	7.94
J &K	9,243	10,940	2.85	30.34	3.97
Karntka	10,131	13,390	4.76	29.88	17.38
Kerala	14,536	18,983	4.55	25.76	9.38
M P	7,792	8,484	1.43	40.64	37.06
Maharatra	9,828	11,424	2.54	37.93	23.72
Orissa	7,072	6,856	-0.52	49.72	48.01
Punjab	30,816	32,425	0.85	11.95	6.35
Rajasthan	7,414	9,788	4.74	26.46	13.74
Tamil Nadu	9,359	11,476	3.46	32.48	20.55
U P	8,427	10,474	3.69	42.28	31.22
W B	13,588	16,932	3.74	40.8	31.85
All India	10,110	11,945	2.82	37.27	27.09
C V	59.01	56.99		35.75	66.48

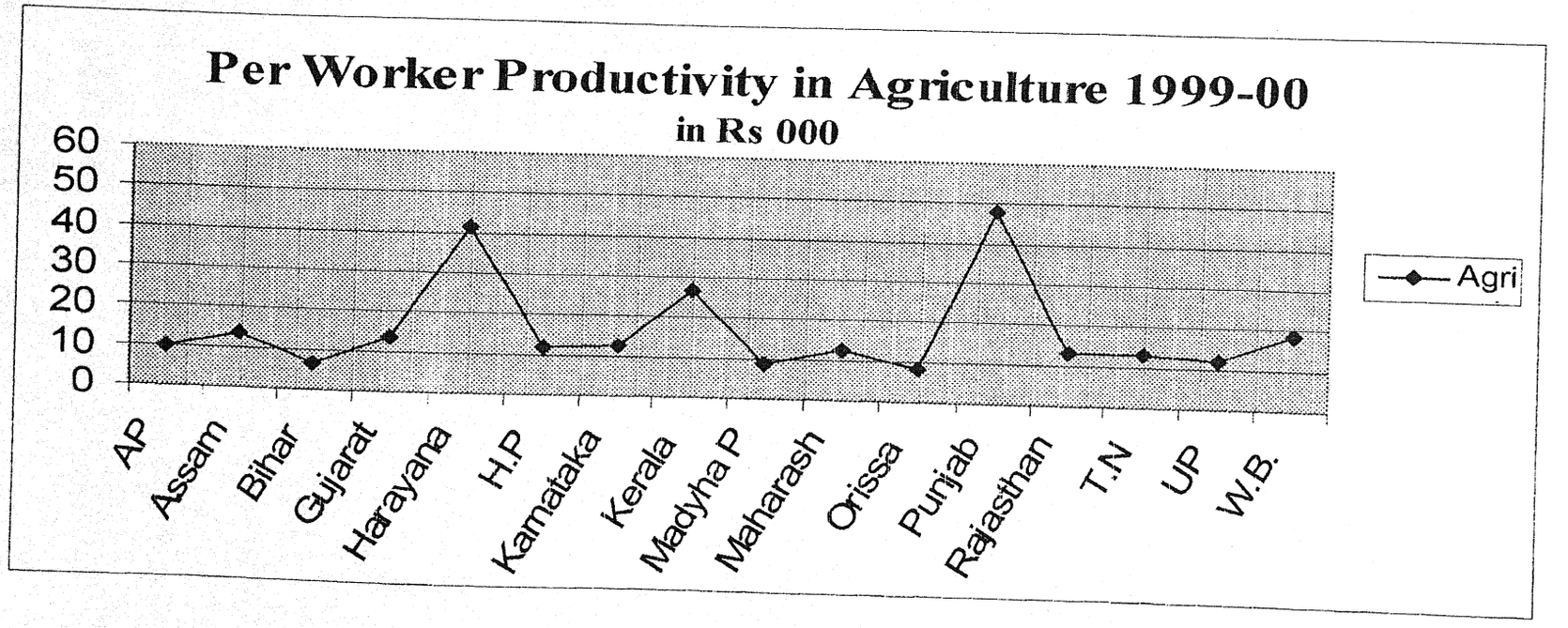

Per Worker productivity in Agriculture 1993-94: Rs. 000
Per Worker Prod
50
45
40
35
30
25
20
15
10
5
0
AP
Assam
Bihar
Gujarat
Harayana
H.P
Karnataka
Kerala
Madyha P
Maharash
Orissa
Punjab
Rajasthan
T.N
UP
W.B.
AGR


Per Worker Productivity in Agriculture 1999-00
in Rs 000
60
50
40
30
20
10
0
AP
Assam
Bihar
Gujarat
Harayana
H.P
Karnataka
Kerala
Madyha P
Maharash
Orissa
Punjab
Rajasthan
T.N
UP
W.B.
Agri

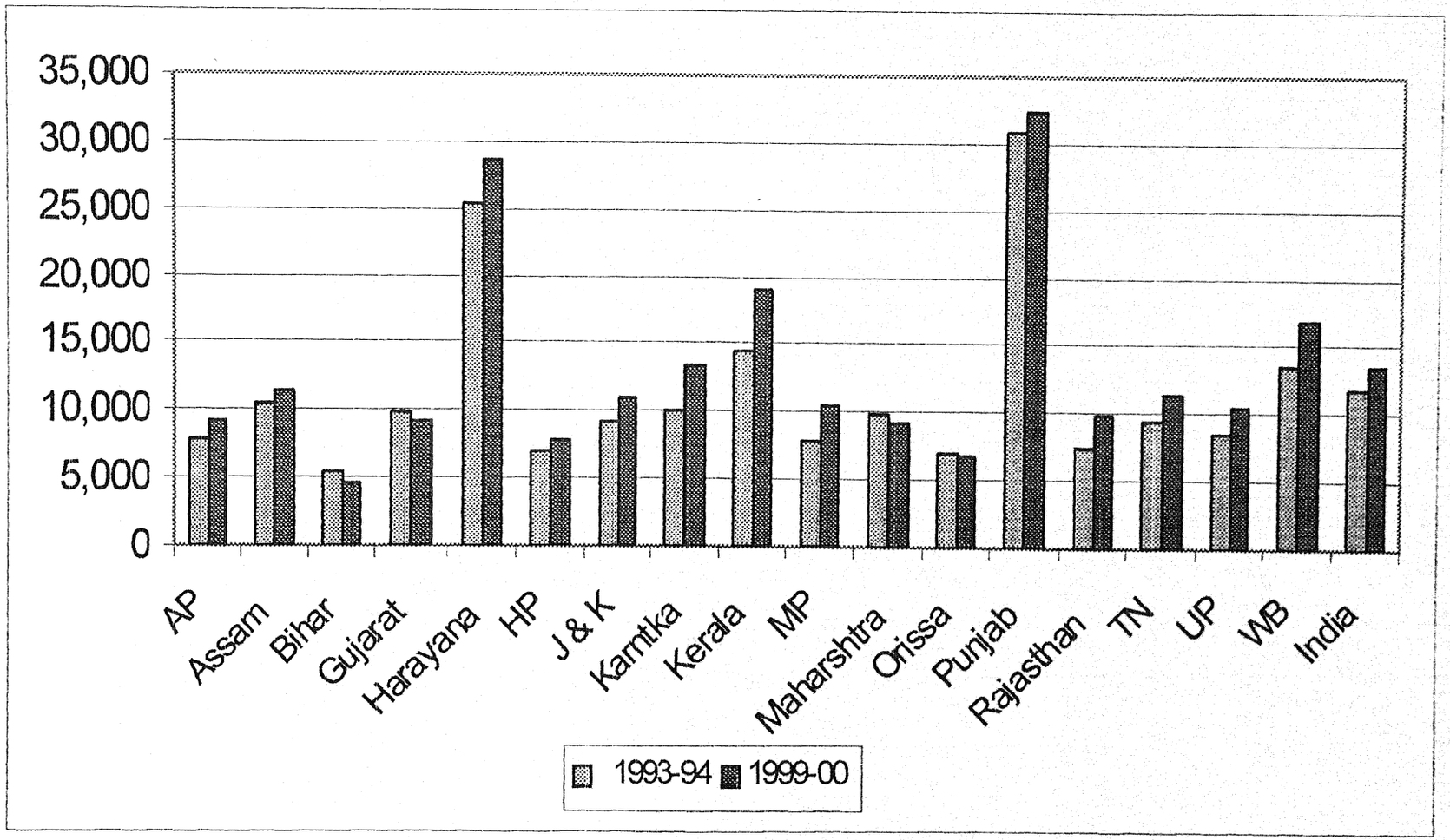
Per Worker Productivity in Agriculture, 1993-94 & 1999-00

UPSS	Per worker Productivity (in Rupees)		Growth Rate	Poverty ratio	
State	1993-94	1999-00	% Annual	1993-94	1999-00
A P	7,972	9,103	2.24	15.92	11.05
Assam	10,461	11,727	1.92	45.01	40.04
Bihar	5,413	4,634	-2.56	58.21	44.3
Gujarat	9,774	9,106	-1.17	22.18	13.17
Haryana	25,362	28,695	2.08	28.02	8.27
H P	6,960	7,792	1.90	30.34	7.94
J &K	9,243	10,940	2.85	30.34	3.97
Karntka	10,131	13,390	4.76	29.88	17.38
Kerala	14,536	18,983	4.55	25.76	9.38
M P	7,792	8,484	1.43	40.64	37.06
Maharatra	9,828	11,424	2.54	37.93	23.72
Orissa	7,072	6,856	-0.52	49.72	48.01
Punjab	30,816	32,425	0.85	11.95	6.35
Rajasthan	7,414	9,788	4.74	26.46	13.74
Tamil Nadu	9,359	11,476	3.46	32.48	20.55
U P	8,427	10,474	3.69	42.28	31.22
W B	13,588	16,932	3.74	40.8	31.85
All India	10,110	11,945	2.82	37.27	27.09
C V	59.01	56.99		35.75	66.48


Per Worker productivity in Agriculture 1993-94: Rs. 000
Per Worker Prod
50
45
40
35
30
25
20
15
10
5
0
AP
Assam
Bihar
Gujarat
Harayana
H.P
Karnataka
Kerala
Madyha P
Maharash
Orissa
Punjab
Rajasthan
T.N
UP
W.B.
AGR


Per Worker Productivity in Agriculture 1999-00
in Rs 000
60
50
40
30
20
10
0
AP
Assam
Bihar
Gujarat
Harayana
H.P
Karnataka
Kerala
Madyha P
Maharash
Orissa
Punjab
Rajasthan
T.N
UP
W.B.
Agri

Per Worker Productivity in Agriculture in Rs./per worker

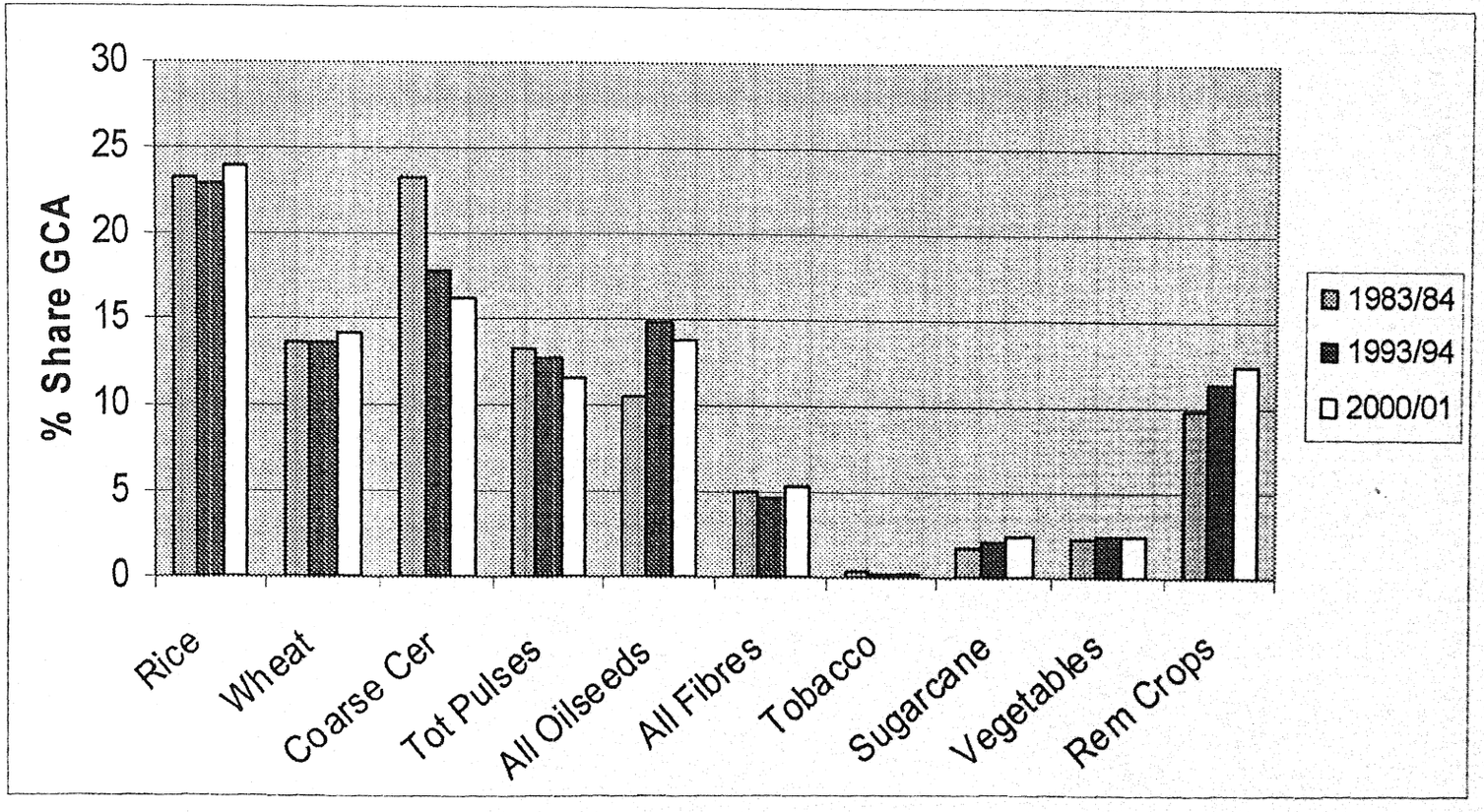


State wise Growth of Agricultural Output, 1962-65, 1970-73, 1980-83, 1993 and 1996-99

State	1970-73/ 1962-65	1980-83 / 1970-73	1990-93 / 1980-83	1996-99 / 1990-93
Haryana	4.65	3.02	5.04	1.98
Himachal Prad	3.33	0.96	2.74	-0.11
J & K	5.37	3.47	0.17	0.49
Punjab	6.63	4.74	4.22	0.73
Uttar Pradesh	2.54	2.77	3.06	2.47
North-West R	**3.60**	**3.21**	**3.55**	**1.91**
Assam	1.85	2.80	2.42	1.31
Bihar	1.12	-0.41	2.12	3.33
Orissa	0.99	2.65	2.92	-5.14
West Bengal	2.37	0.68	5.97	2.99
Eastern Reg	**1.57**	**1.09**	**3.63**	**1.25**
Gujarat	1.78	3.12	0.86	6.83
Madhya Pradesh	1.97	1.28	4.53	3.86
Maharashtra	-3.64	6.57	2.12	3.29
Rajasthan	4.29	1.26	6.06	4.90
Central Reg	**0.73**	**3.13**	**3.33**	**4.50**
Andhra Pradesh	0.93	3.61	3.42	1.52
Karanataka	2.64	2.32	3.68	3.62
Kerala	4.09	-0.91	1.92	3.60
Tamil Nadu	2.76	-0.57	4.00	3.25
Southern Rg	**2.40**	**1.38**	**3.43**	**2.19**
All States	**2.08**	**2.38**	**3.44**	**2.83**

Cropping Pattern Changes 1983-84 to 2000-01

% Share in Gross Cropped Area



Cropping Pattern Changes: % Share of Area under 43 Crops

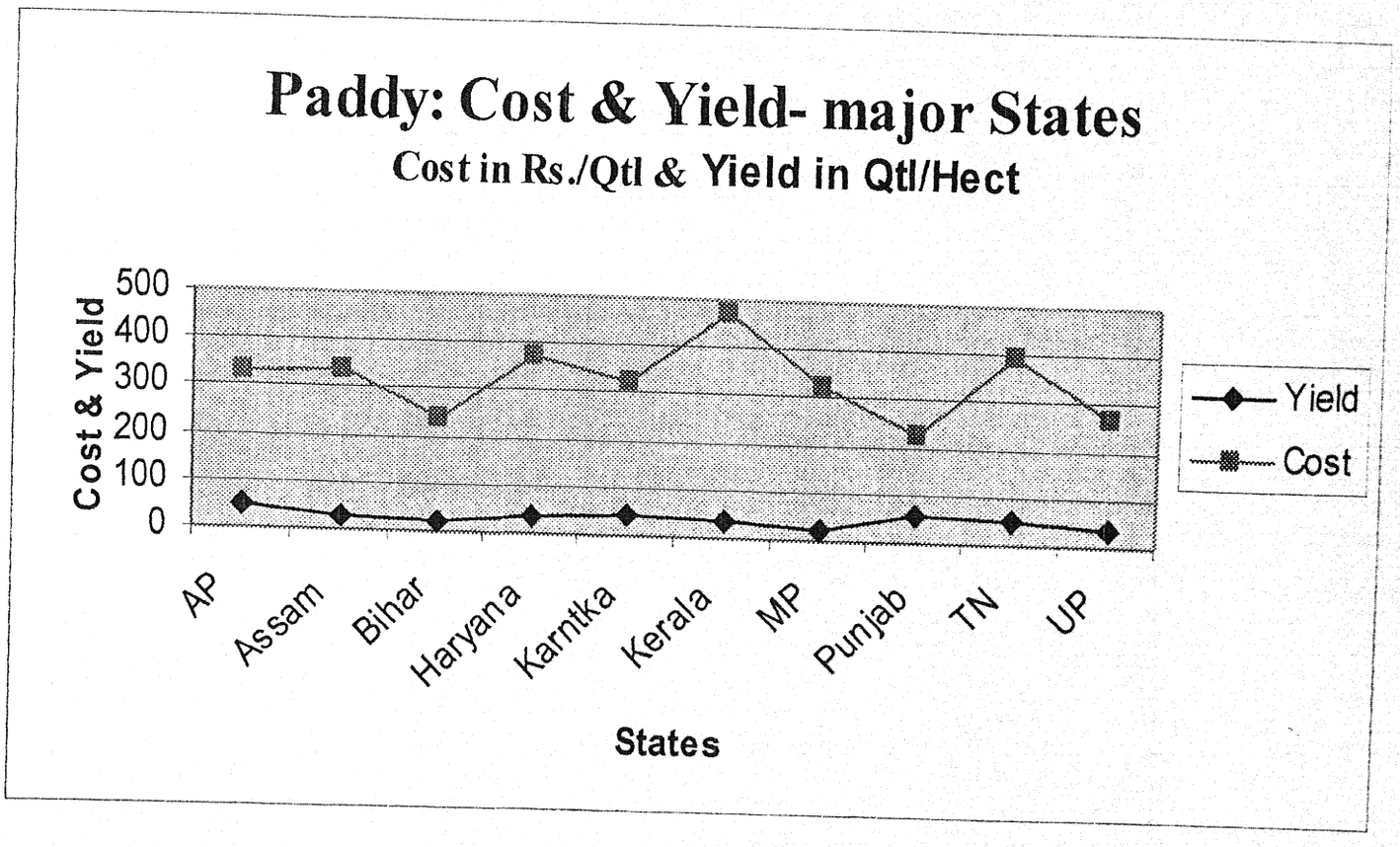
Region\ Period	Rice	Wheat	Coarse Cereals	Pulses	Foodgrains	Non-food Grains	Nine Oilseeds	Fibre Crops	Sugar -cane	Remaining Crops
North-Western Region										
1962-65	15.30	19.98	23.20	20.99	79.47	20.53	12.28	2.49	4.61	1.15
1980-83	18.95	33.83	16.13	10.76	79.68	20.32	10.68	2.89	4.72	2.04
1996-99	23.77	38.56	11.47	8.56	82.36	17.64	6.60	3.37	5.85	1.82
Eastern Region										
1962-65	62.71	2.90	7.37	15.63	88.62	11.38	3.30	4.16	1.01	2.91
1980-83	58.54	7.51	7.58	12.55	86.17	13.83	5.74	3.37	0.86	3.86
1996-99	64.48	9.19	4.24	7.00	84.90	15.10	5.25	3.54	0.80	5.50
Central Region										
1962-65	10.55	9.66	38.14	16.68	75.03	24.97	12.06	9.52	0.44	2.95
1980-83	10.65	10.66	35.94	17.80	75.05	24.95	12.02	8.09	0.69	4.15
1996-99	9.90	11.71	25.55	18.34	65.50	34.50	21.47	7.97	1.02	4.05
Southern Region										
1962-65	24.99	1.01	36.81	9.66	72.47	27.53	12.21	6.17	0.87	8.28
1980-83	24.88	1.10	29.92	11.39	67.30	32.70	13.94	5.66	1.68	11.42
1996-99	24.41	0.81	19.45	12.40	57.07	42.93	19.48	6.14	2.44	14.87
All India										
1962-65	23.78	8.92	29.20	15.93	77.85	22.15	10.59	6.31	1.56	3.69
1980-83	23.96	13.68	25.08	13.91	76.63	23.37	10.92	5.55	1.85	5.05
1996-99	24.96	15.18	17.50	13.11	70.75	29.25	15.03	5.83	2.31	6.08

Cropping Pattern Changes : % Share of Value of Output of 43 Crops

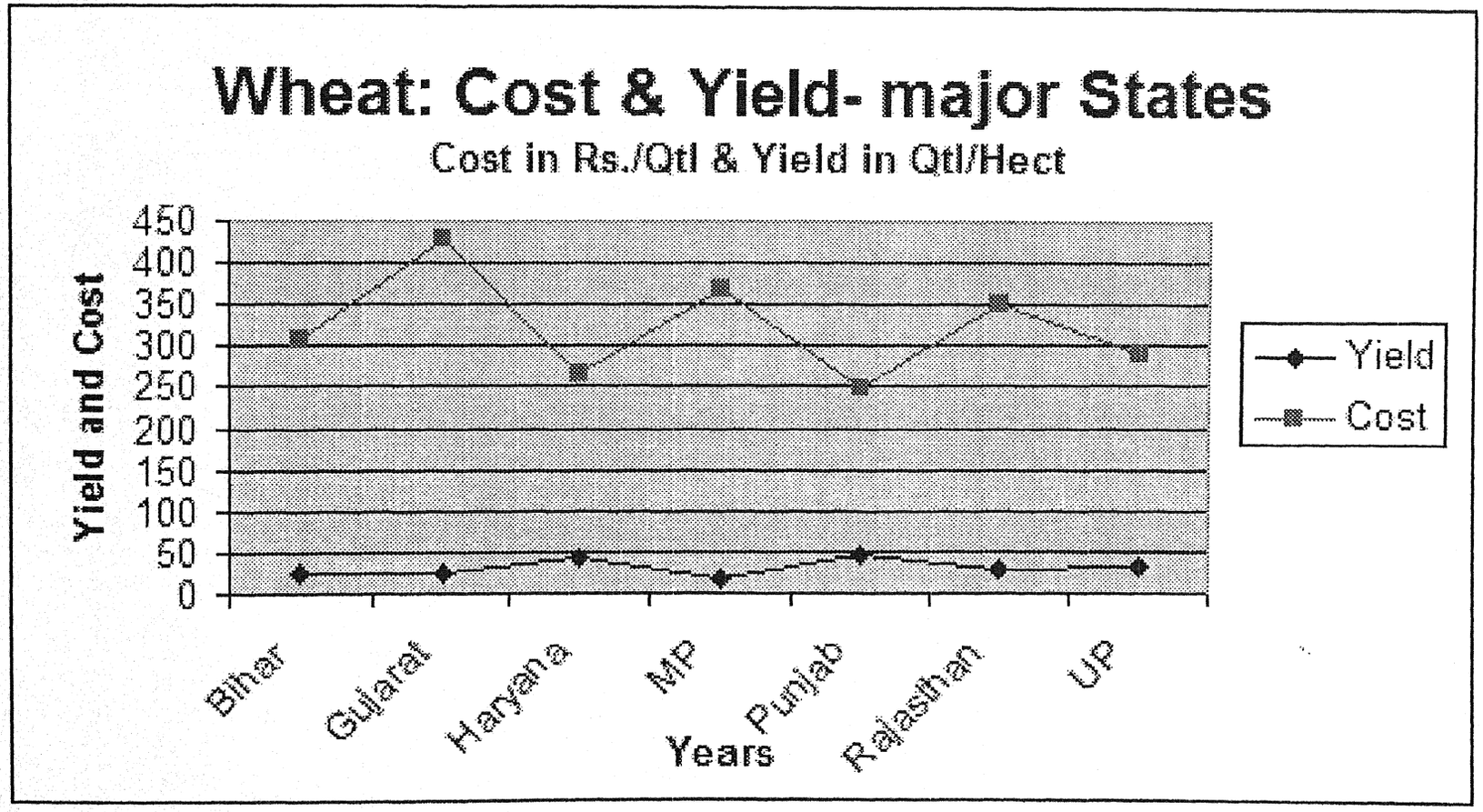
Region\ Period	Rice	Wheat	Coarse Cereals	Pulses	Foodgrains	Nonfood Grains	Nine Oilseeds	Fibre Crops	Sugarcane	Remaining Crops
North-Western Region										
1962-65	12.88	15.42	11.02	23.21	62.53	37.47	11.07	4.87	18.22	3.31
1980-83	19.60	34.68	6.47	8.55	69.30	30.70	6.93	4.25	14.49	5.04
1996-99	24.73	37.55	4.35	4.93	71.56	28.44	5.01	3.12	14.99	5.32
Eastern Region										
1962-65	60.80	1.44	3.33	12.11	77.68	22.32	2.66	4.54	3.88	11.24
1980-83	50.90	7.00	3.35	8.88	70.13	29.87	6.18	3.77	3.17	16.74
1996-99	57.15	7.81	2.29	3.43	70.68	29.32	3.76	3.63	2.23	19.70
Central Region										
1962-65	13.79	7.79	20.41	16.39	58.37	41.63	18.11	11.89	4.16	7.46
1980-83	12.82	12.40	18.10	15.49	58.81	41.19	17.42	9.36	6.72	7.70
1996-99	9.41	13.57	10.93	13.77	47.68	52.32	29.18	9.37	5.99	7.79
Southern Region										
1962-65	31.01	0.21	12.14	3.34	46.70	53.30	15.11	3.70	5.99	28.50
1980-83	31.09	0.30	10.01	3.79	45.20	54.80	12.29	3.84	8.92	29.76
1996-99	25.94	0.17	6.54	3.26	35.91	64.09	13.34	4.39	9.21	37.15
All India										
1962-65	27.86	6.27	12.39	13.51	60.02	39.98	12.42	6.43	7.98	13.15
1980-83	26.27	14.89	9.94	9.16	60.27	39.73	10.94	5.40	8.92	14.47
1996-99	25.76	15.92	6.52	6.82	55.01	44.99	14.01	5.32	8.65	17.01

Region wise Cropping Pattern and productivity
(Rs/hc. at 1990-93 constant prices)

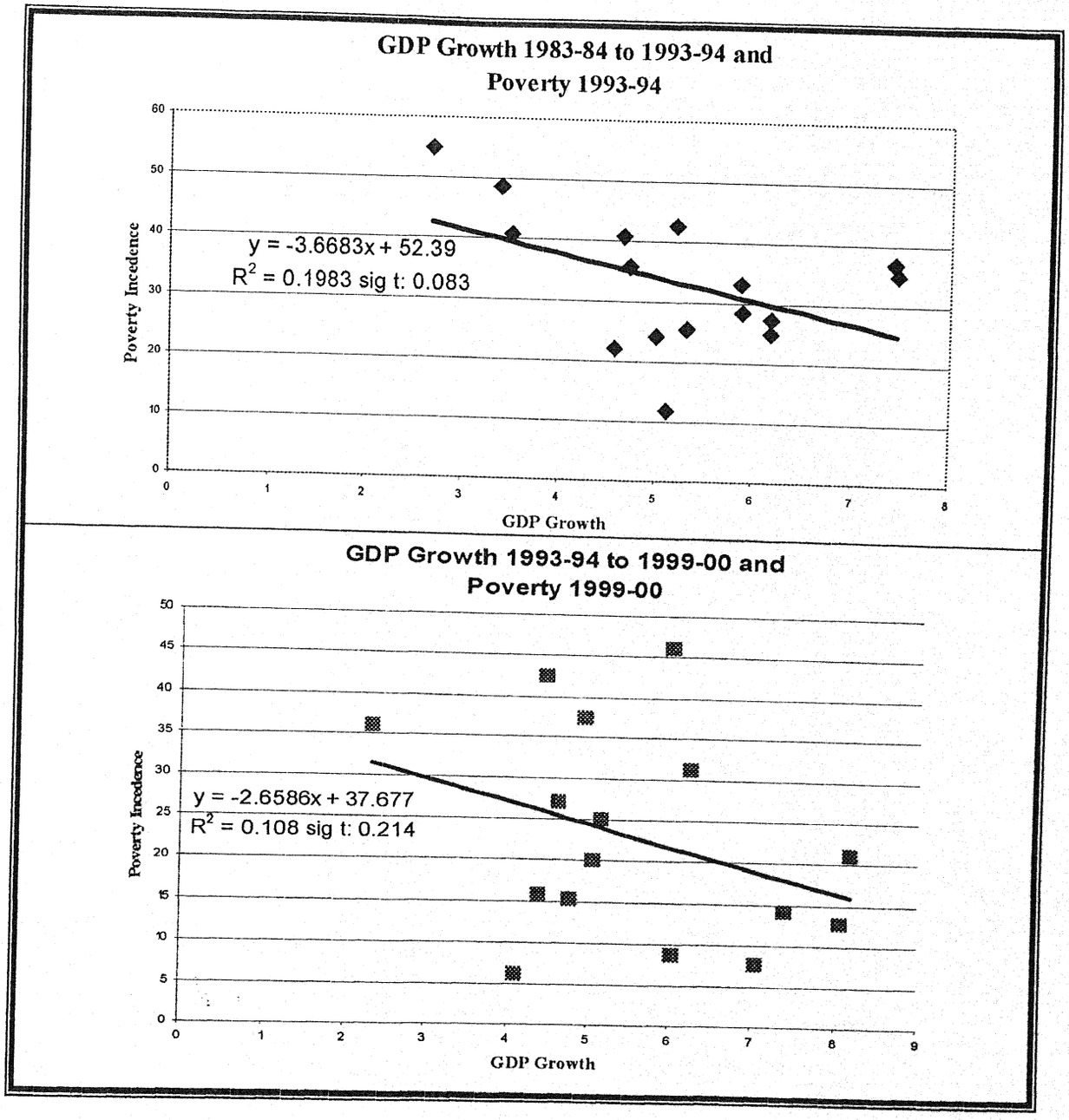
	% Share of Area		% Share Value Output		Productivity
Region\Perid	Foodgrains	Non-foodgrains	Foodgrains	Non-foodgrains	In Rs/Hect
N.W. Reg					
1962-65	79.47	20.53	62.53	37.47	4075
1996-99	82.36	17.64	71.56	28.44	10081
Eastern Reg					
1962-65	88.62	11.38	77.68	22.32	4344
1996-99	84.90	15.10	70.68	29.32	7809
Central Reg					
1962-65	75.03	24.97	58.37	41.63	2630
1996-99	65.50	34.50	47.68	52.32	5555
Southern Reg					
1962-65	72.47	27.53	46.70	53.30	4798
1996-99	57.07	42.93	35.91	64.09	10841
All India					
1962-65	77.85	22.15	60.02	39.98	3736
1996-99	70.75	29.25	55.01	44.99	7963

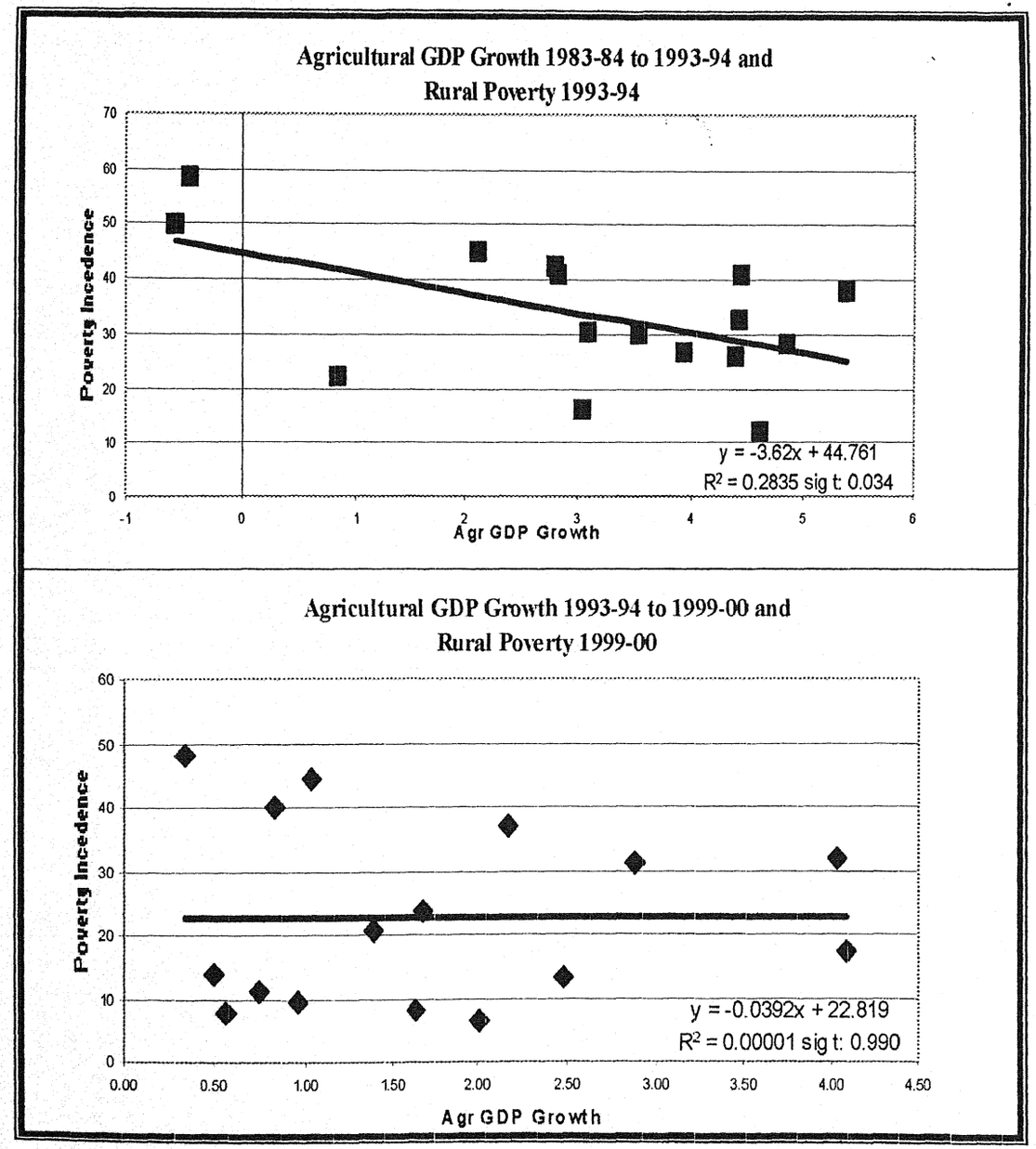


Paddy 99-00	AP	Ass	Bih	Har	Kar	Ker	MP	Pun	TN	UP
Yield (Qtls/Hect)	47	25	24	37	44	33	20	55	47	33
Cost (Rs./Qtl)	334	337	241	373	325	475	324	227	395	269

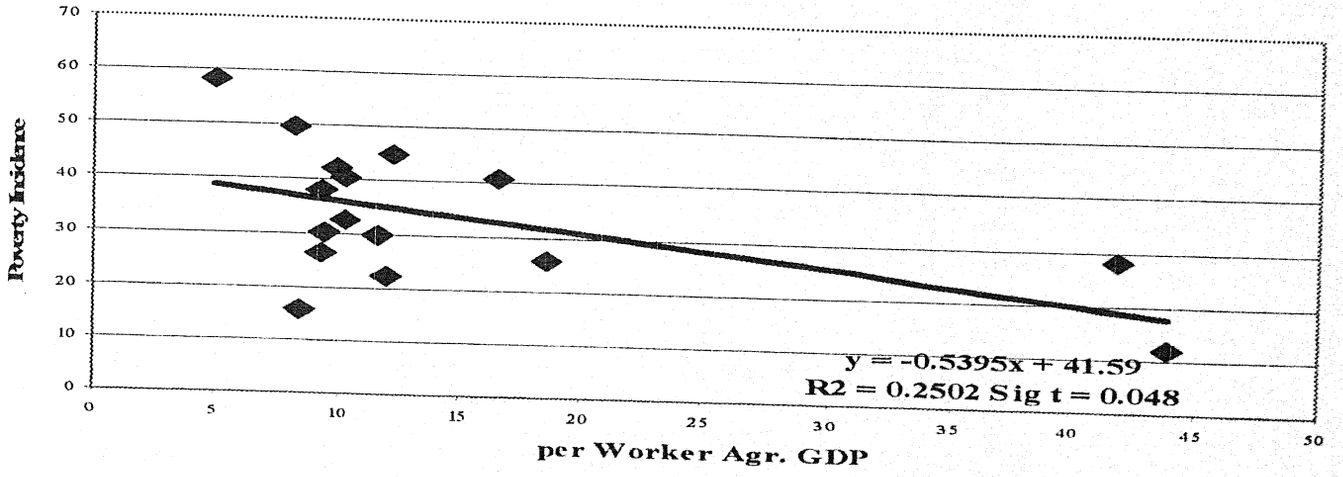


Wheat 1999-00	Bihar	Gujarat	Haryana	MP	**Punjab**	Rajasth	UP
Yield (Qtls/Hect)	25	26	42	17	**48**	29	33
Cost (Rs./Qtl)	308	428	264	369	**246**	350	292

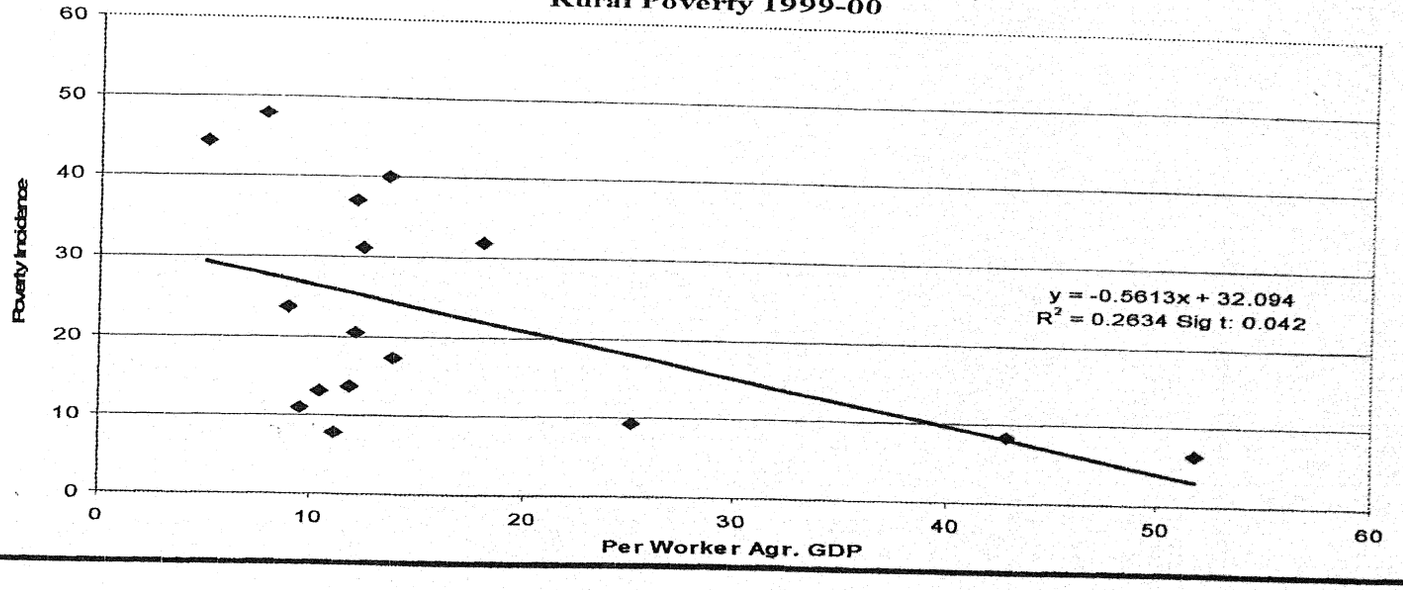

GDP Growth 1983-84 to 1993-94 and Poverty 1993-94
Poverty Incedence
GDP Growth
y = -3.6683x + 52.39
R2 = 0.1983 sig t: 0.083
GDP Growth 1993-94 to 1999-00 and Poverty 1999-00
Poverty Incedence
GDP Growth
y = -2.6586x + 37.677
R2 = 0.108 sig t: 0.214

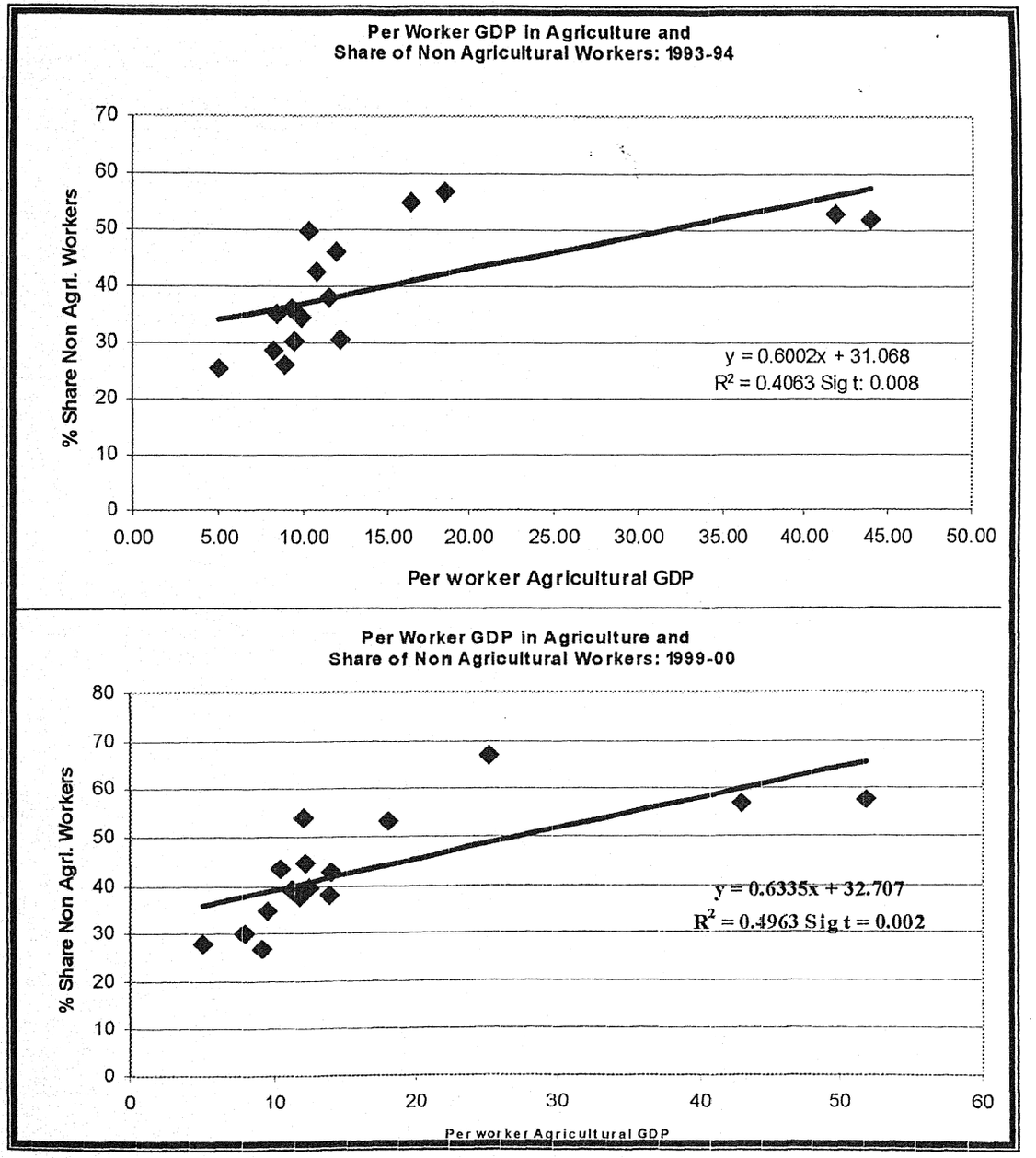

Agricultural GDP Growth 1983-84 to 1993-94 and
Rural Poverty 1993-94
Poverty Incedence
Agr GDP Growth
y = -3.62x + 44.761
R² = 0.2835 sig t: 0.034
Agricultural GDP Growth 1993-94 to 1999-00 and
Rural Poverty 1999-00
Poverty Incedence
Agr GDP Growth
y = -0.0392x + 22.819
R² = 0.00001 sig t: 0.990

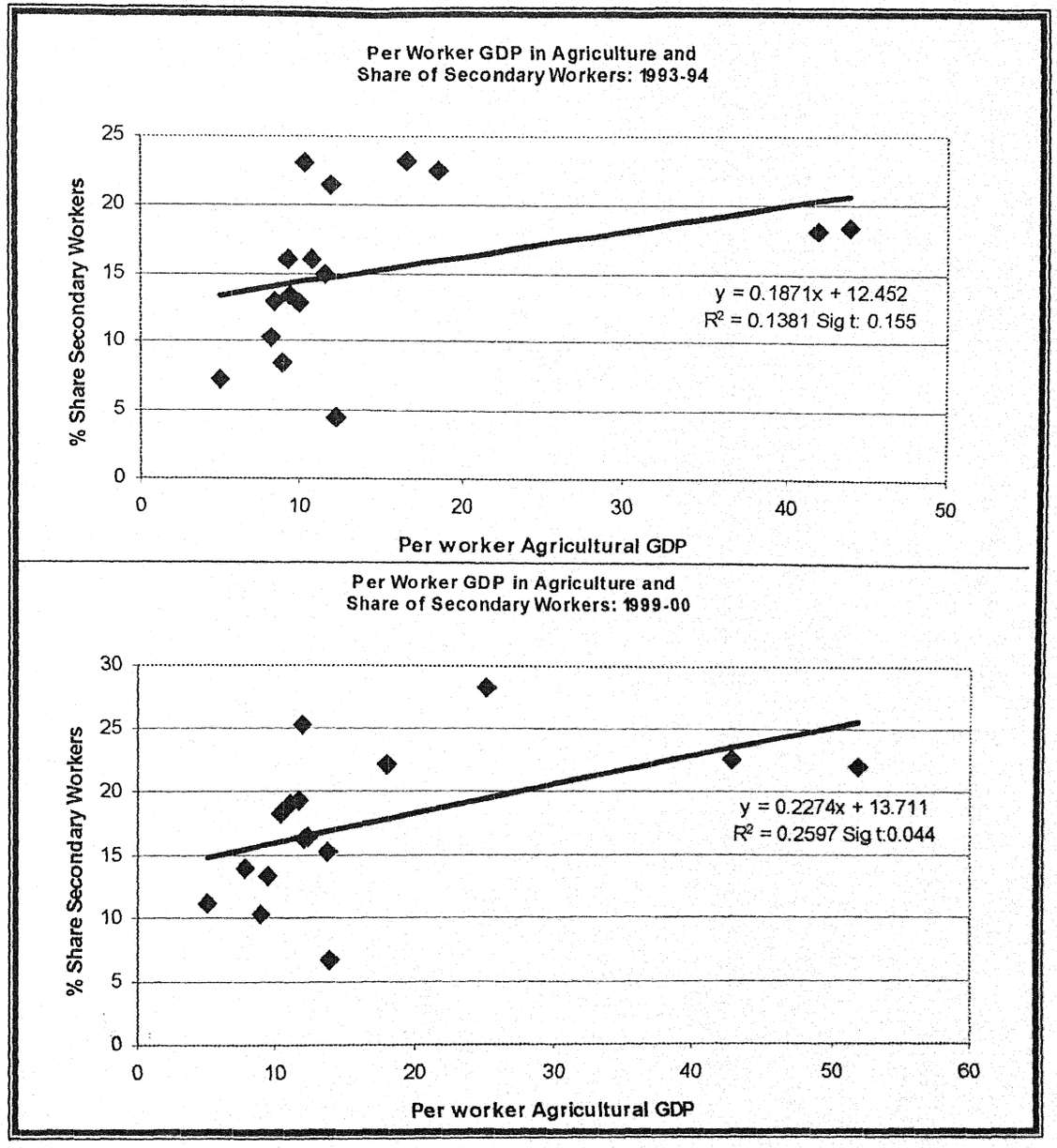
Per Worker Agr. GDP 1993-94 (Rs. 000) and Rural Poverty 1993-94



Per Worker Agr. GDP 1999-00 (Rs. 000) and Rural Poverty 1999-00




Per Worker GDP in Agriculture and
Share of Non Agricultural Workers: 1993-94
% Share Non Agrl. Workers
Per worker Agricultural GDP
y = 0.6002x + 31.068
R² = 0.4063 Sig t: 0.008
Per Worker GDP in Agriculture and
Share of Non Agricultural Workers: 1999-00
% Share Non Agrl. Workers
Per worker Agricultural GDP
y = 0.6335x + 32.707
R² = 0.4963 Sig t = 0.002


Per Worker GDP in Agriculture and
Share of Secondary Workers: 1993-94
% Share Secondary Workers
Per worker Agricultural GDP
y = 0.1871x + 12.452
R² = 0.1381 Sig t: 0.155
0
5
10
15
20
25
0
10
20
30
40
50
Per Worker GDP in Agriculture and
Share of Secondary Workers: 1999-00
% Share Secondary Workers
Per worker Agricultural GDP
y = 0.2274x + 13.711
R² = 0.2597 Sig t:0.044
0
5
10
15
20
25
30
0
10
20
30
40
50
60

INAUGURAL ADDRESS

CHALLENGES BEFORE INDIAN AGRICULTURE

By

PROFESSOR V.S. VYAS

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

CHALLENGES BEFORE INDIAN AGRICULTURE

Inaugural Address to National Seminar on Agricultural Growth in Post-Reform Period: Regional Perspectives.

By

Prof. V.S.Vyas.

1

CHALLENGES BEFORE INDIAN AGRICULTURE

- There has been creditable growth in Indian Economy in recent years.
- The growth, however, is fuelled by Industry and Services.
- Agriculture's record has been lackluster.

2

CHALLENGES BEFORE INDIAN AGRICULTURE

This has not always been so.

During the period of seventies and eighties agriculture growth was comfortably above the population growth.

How was this made possible?

3

CHALLENGES BEFORE INDIAN AGRICULTURE

During that period, i.e. broadly in the Green Revolution phase:

- There was a clear objective of achieving self-sufficiency in food by raising domestic production.
- Concerted and *simultaneous* efforts were made in different areas, e.g., technological, organizational, policy related. There was a multi-prong, synchronized, strategy.
- Price policy pursued during that phase kept the real prices of food grains more or less stable, while the producers gained with better income terms of trade (due to increase in productivity).

4

CHALLENGES BEFORE INDIAN AGRICULTURE

Of course, all was not well during that period

- Bias for irrigated crops had detrimental impact on the natural resource base.
- Rainfed crops and rainfed regions were neglected.

5

CHALLENGES BEFORE INDIAN AGRICULTURE

Stagnation in agricultural growth in the Post-Reform period cannot be attributed to;

- Adverse terms of trade
- Impact of WTO. Or
- Diminishing size of agricultural holdings.

6

CHALLENGES BEFORE INDIAN AGRICULTURE

The major causes for stagnation are;

- Failure to reform institutions as mismatch between agrarian structure (progressive tilt towards small and marginal holdings) and the supportive institutions in extension, credit and marketing emerged.
- Greater emphasis on the output prices to stimulate growth to the neglect of non-price factors (e.g. technology, infrastructure, institutional change).
- Deceleration in public investment in rural infrastructure.
- MSP centered price policy, which has outlived its utility and is creating more distortions in production and marketing.
- Disconnect between various policies impinging on agricultural growth, e.g., greater reliance on (diminishing supply of) ground water and concessional supply of power to lift water.

7

CHALLENGES BEFORE INDIAN AGRICULTURE

It is debatable whether in the short run slow growth in agriculture will cause a demand constrain for the non farm sector, but it will certainly decelerate rate of reduction in poverty, and will jeopardize livelihood prospect for the rural work force.

8

CHALLENGES BEFORE INDIAN AGRICULTURE

Challenges before Indian Agriculture are;

- Take steps to stop the deterioration in the production base, i.e. land and water, in irrigated as well as in the rain fed areas.
- Reform the supportive institutions of Research, Extension, Credit and Marketing and make them more congruent to the small farm dominated agrarian structure.
- Accelerate public and private investment in agriculture.
- Encourage high value agriculture along with risk mitigating policies and programs.
- Work towards improved cost-benefit ratio in agriculture by more efficient use of the purchased inputs.
- Make conscious efforts to link agricultural growth with non-farm activities in rural areas (learn the lesson from China).

9

CHALLENGES BEFORE INDIAN AGRICULTURE

For meeting these challenges the states have to play the major role. However, the Centre cannot abdicate its responsibility because major areas of decision-making are with the Centre.

10

CHALLENGES BEFORE INDIAN AGRICULTURE

Thank you

V.S.Vyas

March 27, 2006

11

CHALLENGES BEFORE INDIAN AGRICULTURE

Inaugural Address to National Seminar on Agricultural Growth in Post-Reform Period: Regional Perspectives.

By
Prof. V.S.Vyas.

There has been creditable growth in Indian Economy in recent years.
The growth, however, is fuelled by Industry and Services.
Agriculture's record has been lackluster.

This has not always been so.
During the period of seventies and eighties agriculture growth was comfortably above the population growth.
How was this made possible?

During that period, i.e. broadly in the Green Revolution phase:

- There was a clear objective of achieving self-sufficiency in food by raising domestic production.
- Concerted and *simultaneous* efforts were made in different areas, e.g., technological, organizational, policy related. There was a multi-prong, synchronized, strategy.
- Price policy pursued during that phase kept the real prices of food grains more or less stable, while the producers gained with better income terms of trade (due to increase in productivity).

Of course, all was not well during that period

- Bias for irrigated crops had detrimental impact on the natural resource base.
- Rained crops and rained regions were neglected.

Stagnation in agricultural growth in the Post-Reform period cannot be attributed to

- Adverse terms of trade
- Impact of WTO. Or
- Diminishing size of agricultural holdings.

The major causes for stagnation were

- Failure to reform institutions as mismatch between agrarian structure (progressive tilt towards small and marginal holdings)

and the supportive institutions in extension, credit and marketing emerged.

- Greater emphasis on the output prices to stimulate growth to the neglect of non-price factors (e.g. technology, infrastructure, institutional change).
- Deceleration in public investment in rural infrastructure
- MSP centered price policy, which has outlived its utility and is creating more distortions in production and marketing.
- Disconnect between various policies impinging on agricultural growth, e.g., greater reliance on (diminishing supply of) ground water and concessional supply of power to lift water.

It is debatable whether in the short run slow growth in agriculture will cause a demand constrain for the non farm sector, but it will certainly decelerate rate of reduction in poverty, and will jeopardize livelihood prospect for the rural work force.

Challenges before Indian Agriculture are

- Take steps to stop the deterioration in the production base, i.e. in land and water in irrigated as well as in the rain fed areas.
- Reform the supportive institutions of Research, Extension, Credit and Marketing and make them more congruent to the small farm dominated agrarian structure.
- Accelerate public and private investment in agriculture.
- Encourage high value agriculture along with risk mitigating policies and programs.
- Work towards improved cost-benefit ratio in agriculture by more efficient use of the purchased inputs.
- Make conscious efforts to link agricultural growth with non-farm activities in rural areas (learn the lesson from China).

For meeting these challenges the states have to play the major role. However, the Centre cannot abdicate its responsibility because major areas of decision-making are with the Centre.

Lucknow

March 27, 2006.

AGRICULTURAL GROWTH IN PRE AND POST REFORM PERIOD : AN INTER-STATE STUDY

By

RICHA SINGH

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

Agricultural Growth in Pre and Post Reform Period: An Inter-State Study

Richa Singh

A major premise of the economic reforms initiated since the early nineties was that it will give a boost to agricultural production and exports of agricultural products by eliminating the earlier bias against the agricultural sector. However, contrary to these expectations agricultural growth plummeted during the nineties. This paper presents the results of an analysis of state-wise growth rate in value of agricultural output and trends in area, output and yield of foodgrains during the pre (1981-90) and the post (1991-04) reform period. The paper also discusses trends in output of major crops both commercial and non-commercial at the All India level.

The analysis shows that the pre reform period witnessed reasonably high growth rates in agriculture. Agricultural growth during this period was spatially well spread and regionally even. However, the high agricultural growth rates of the eighties could not be maintained through the nineties. This deceleration in the growth rate of agriculture in the post reform period was recorded in the majority of the states. Broadly similar results emerge for foodgrains and commercial crops as well as value of agricultural output. Yields of main crops also show a similar trend.

The factors that have contributed to the decline in agricultural growth in the nineties include declining public investment in agriculture and rural infrastructure, poor maintenance of canals, inadequate and erratic power supply, continuation of various controls in the agricultural sector, slackening of demand for foodgrains, absence of new technological breakthrough and declining total factor productivity.

I. Introduction

The economic reforms initiated since 1991 were expected to make a significant impact on the prospects of agriculture sector, which was supposed to be dis-protected (Gulati 1990). Indeed, one of the important premises of economic reforms was its supposedly pro-agriculture bias. Many economists displayed great optimism about the future of the agricultural sector due to the high export potential and comparative advantage in trade of the agricultural goods that India is supposed to enjoy. Economists anticipated positive impact on domestic production and supply of agricultural goods through price gains and a favourable impact on rural employment due the high labour intensity of the sector (Rao 1994). World trade was expected to become more competitive and based on comparative advantage through reduction of barriers to trade and elimination of high amount of domestic support given by developed countries. India was in a favorable position in this context. Higher prices and favorable impact of institutional factors was expected to increase efficiency of production and increase private investment in agriculture. However, contrary to these expectations agricultural growth seems to have plummeted during the nineties.

Studies by several scholars (Dev 1987, Bhalla and Singh 1997; Sawant and Achuthan 1995; Sawant 1997) reveal that there was acceleration in agricultural growth rate during the

1980s. This growth was regionally more diversified as compared to the previous period. These studies forecast continuation of high growth rates and displayed optimism regarding the future of the sector in the post reform period. However, later studies demonstrate that the high growth rate of the 1980's could not be maintained through the 1990's, i.e. the post reform period (Bhalla 2000, Thamarajakshi 1999, Balakrishnan 2000, Ghosh 2002).

The *Mid-Term Appraisal of the Ninth Five Year Plan* (Planning Commission, 2001) also showed a decline in growth rate of agricultural output, from 3.7 per cent per annum during the eighties (1979-80 to 1989-90), to 2.4 per cent per annum during the nineties (1989-90 to 1998-99). This decline was more perceptible in the case of foodgrains (from 3.5 per cent per annum to 1.8 per cent per annum) than for non-foodgrains (from 4.0 per cent per annum to 3.2 per cent per annum). The *Mid-Term Appraisal of the Tenth Five Year Plan* (Planning Commission, 2005) further confirmed the continuation of the deceleration in agriculture sector and particularly in the crop sector. Agricultural output increased at the rate of 3.1 per cent during 1980-97, but the growth rates slipped to 1.1 per cent per annum after 1996-97. Yield growth decelerated throughout the 1990s, to about 1 per cent per annum from 3 per cent during the 1980s. The period is also marked by increasing capital intensity of agriculture, lower profitability and slower increase in input use.

Given the importance of the agricultural sector for the economy as a whole and in particular for the vulnerable sections, who are greatly affected by shifts in foodgrain production and prices, the decline in growth rate of the sector is a cause of serious concern, which needs an in-depth analysis. The objective of this paper is to study the temporal and spatial pattern of agricultural growth in the last two and a half decades across the states. The period is sub-divided into two sub-periods. The decade of eighties represents the pre-reform period, while the period since 1990-91 is taken to represent the post- reform period. Trends have been analysed for 17 major states.

The paper is divided into nine sections including this introductory section. In Section II methodology and data sources have been discussed. Section III analyses trends in value of agricultural output. Crop wise trends in production, area and yield at all India level are presented in Section IV. Section V presents statewise trends in foodgrain production, while Section VI discusses trends in foodgrain area and yield. Section VII discusses statewise trends in output of major crops. Section VIII briefly discusses the reasons for deceleration in agriculture growth rates. The main findings have been summed up in the final section.

II. Methodology and Data Sources

Inter-state trends have been analyzed in terms of the growth rate of foodgrain output. Foodgrains account for nearly two-thirds of the gross cropped area in the country. Hence a study based on trends in foodgrains output is broadly representative of the growth of the agricultural sector as a whole. This becomes unavoidable as the index numbers of agricultural output as a whole or separately for food and non-food crops are not readily available for different states. Data on foodgrain output have been taken from the *Handbook of Indian Economy* published by the *Reserve Bank of India*. Area and output estimates for food grains have been derived from data published by the *Directorate of Economics and Statistics*, Ministry of Agriculture.

However, to have an idea of the growth rate of the agricultural sector as a whole we have also discussed the growth rates in value of agricultural output. Trends in value of agricultural output have been analyzed using the time series data provided by CSO.

Growth rates have been estimated by fitting a kinked exponential model of the following form:

$$\ln Y_t = \alpha_1 + \beta_1 (D_1 t + D_2 k) + \beta_2 (D_2 t - D_2 k) + \mu_1$$

Where,

$\ln Y_t$ = log of agricultural output
β_1 = growth rate for period 1 i.e. 1981-1991
β_2 = growth rate for period 2 i.e. 1992-2003
k = break point (1991 is taken as break point, hence k =11)
D = dummy variable having value 1 for period before 1991 and 0 for period after 1991
α_1 = Constant
μ_1 = error term

The method adjusts for the kink by smoothing over the break point and ensures that the growth rate for the entire period lies between the growth rates of the two sub-periods. Kinked exponential models by imposing a continuity restriction at the break points between sub periods, eliminates the discontinuity bias and thus provides an improved basis for comparison of growth rates (Boyce, 1986). Secondly, since the whole series and all observations of the variable are taken into account in the kinked exponential method is preferred over the discontinuous estimates over two sub-periods.

We have also used the technique of dummy variable of the following form to see the impact of the economic reforms on agricultural output:

$$\ln Y = a + bt + c (t-t^*) D + u_1$$

Where,

ln Y= log of agricultural output
t=year
t*=chosen year of shift
D= dummy variable taking value 1 for years after t* and 0 otherwise
u= error term
b= growth rate
c= magnitude of shift from t* onwards sign determines direction of shift

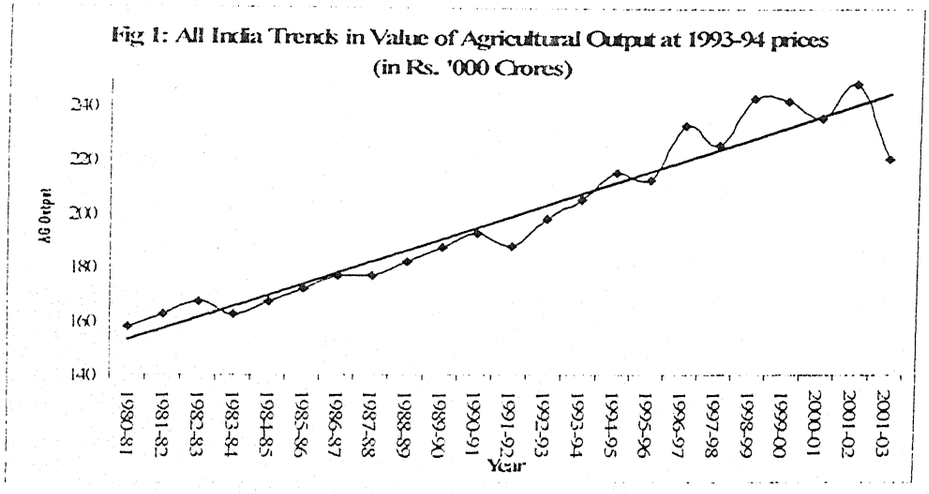
An attempt has also been made to ascertain possible year of shifts in agricultural output in different states. The optimum division of time period is done by comparing the residual sum of squares (RSS). The year with the lowest RSS is taken as the year of shift as done by some scholars earlier (Dholakia 1980, Reddy et. al. 1998).

A quadratic function of the form $\log Y = a + b_1 t + b_2 t^2$ has also been fitted on food grain output and value of agricultural output to examine acceleration or deceleration in growth rate. The positive sign of b_2 indicates acceleration in growth rate over time, while a negative sign indicates deceleration.

We start with a discussion of the state level trends in the value of agricultural output.

III. Trends in Value of Agriculture Output

Trends in value of agricultural output have been analyzed using the time series data provided by CSO. The data is disaggregated for different crops and output from livestock and animal husbandry is excluded. Hence the analysis gives a better view of the performance of agriculture sector in the last two decades as compared to NSDP agriculture data.



The results of the kinked exponential model are presented in Table 1. At the national level, agricultural output registered a modest growth rate of 2% in the pre reform period. During this period, high growth rates were registered by the states of West Bengal (4.7%), Tamilnadu (4.2%), Rajasthan (4.1%) and Punjab (3.9%). Above average growth rates were recorded by states of Haryana (3%), A.P (3%), M.P. (2.8%), Karnataka (2.7%), U.P (2.5%) and Orissa (2.1%). The states of Kerala, Assam, H.P and Maharashtra registered relatively low growth of less than 2% per annum. Performance of Gujarat, J & K, and Bihar was poor during this period. The process of agricultural growth in the eighties was spatially well spread and regionally even (cf. Bhalla and Singh 1997; Sawant 1997).

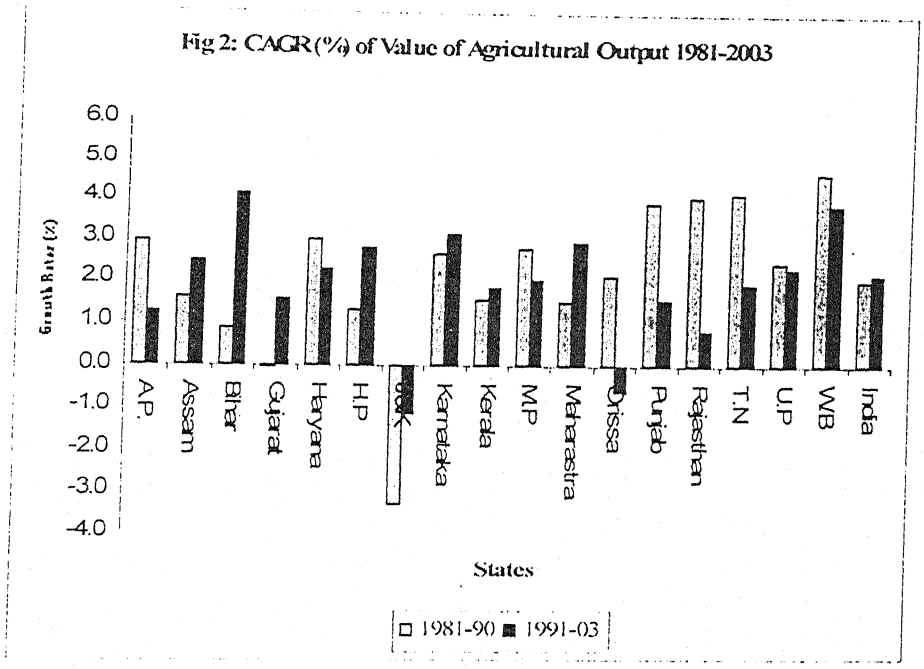
Table 1: Compound Annual Growth Rates of Value of Agricultural Output: 1981-2003

States	1981-82 to 1990-91	1991-92 to 2002-03	1981-82 to 2002-03
Andhra Pradesh	3.0 (5.2)	1.2 (2.7)	2.0 (8.2)
Assam	1.6 (9.8)	2.5 (18.9)	2.1 (26.3)
Bihar	0.8 (1.6)	4.1 (9.5)	2.7 (9.8)
Gujarat	-0.1 (-0.1)	1.5 (1.6)	0.8 (1.8)
Haryana	3.0 (12.5)	2.3 (11.7)	3.5 (25.4)
Himachal Pradesh	1.3 (2.0)	2.8 (5.3)	2.1 (8.0)
Jammu and Kashmir	-3.3 (-2.2)	-1.2 (-1.0)	-2.1 (-3.5)
Karnataka	2.7 (5.8)	3.1 (8.4)	2.9 (16.0)
Kerala	1.5 (2.4)	1.8 (3.6)	1.7 (6.9)
Madhya Pradesh	2.8 (5.1)	2.0 (4.6)	2.3 (10.8)
Maharashtra	1.5 (2.3)	2.9 (5.7)	2.3 (8.7)
Orissa	2.1 (2.6)	-0.7 (-1.0)	0.5 (1.6)
Punjab	3.9 (16.2)	1.5 (7.7)	2.6 (15.9)
Rajasthan	4.1 (3.8)	0.8 (1.0)	2.2 (5.0)
Tamilnadu	4.2 (4.5)	1.9 (2.6)	2.9 (7.6)
Uttar Pradesh	2.5 (10.8)	2.3 (12.5)	2.4 (26.5)
West Bengal	4.7 (5.8)	3.9 (5.9)	4.2 (13.2)
India	2.0 (6.7)	2.1 (8.8)	2.1 (17.7)

Source: Computed from data from CSO.

Note: Figures in parentheses give values of 't' test.

During the post reform period growth rate of value of agricultural output at the all India level was again a moderate 2.1%. Thus, there is no apparent slow down in the second period at the national level (Fig 2). But, the picture across the states is mixed. A decline in growth rate of value of agricultural output was recorded in a majority of the states, with the exception of Assam, Bihar, Karnataka, Gujarat, H.P, Kerala and Maharashtra, all of which registered below average growth in Period I. The decline in the growth rate was very sharp in the states of Rajasthan, Orissa, Punjab, Tamilnadu and A.P. In these states agricultural growth rates declined to almost half of the rates registered in the previous period. While Haryana, West Bengal, M.P and U.P. observed moderately lower growth rates in the second period. The better performing states in the eighties thus slowed down during the nineties. Orissa and J&K observed negative growth rates during the post-reform period. Bihar, however, showed a recovery in growth rate during this period. Thus, the phenomenon of deceleration in growth of the agricultural sector is geographically wide spread across the country. The northern and eastern states with better irrigation facilities, which were the main beneficiary of the green revolution technology, seem to have done relatively poorly as compared to the dry states of western and southern India during the post-reform period. The latter states have also experienced greater diversification within the agricultural sector as compared to the former states.



Over the entire period, West Bengal was the best performing state with a growth rate of 4.2%. The other states with above average growth rates were those of Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, H.P, M.P, Assam and Tamilnadu, all of which have registered a growth rate above 2 % per annum. The poor performing states were Gujarat, Orissa, Kerala, while Jammu and Kashmir registered a negative growth for the entire period.

Table 2 shows the results of the quadratic function for different states. The high values of R square in majority of the states show that the quadratic function fits well on the data series in all states except J&K, Gujarat and Orissa. The country as a whole and 10 states reveal acceleration in the growth rate of value of agricultural output. Negative values of b_2 confirm deceleration in seven states, namely, A.P, Haryana, M.P, Orissa, Punjab, Tamilnadu and Rajasthan. Thus, analysis of the trends in agricultural output does not completely support the hypothesis of deceleration in growth rate of agriculture at the all India level and the majority of states as far as value of agricultural output is concerned.

Table 2: Results of Quadratic Regression on Value of Agricultural Output: 1980-81 to 2001-02

State	Rsq	F	b0	b1	b2
Andhra Pradesh	0.8	31.6	1059190	50155.9	-858.5 (-1.3)
Assam	1.0	516.9	394425	2674.3	313.0 (5.7)
Bihar	0.9	74.2	1021299	-14697.0	2059.0 (4.0)
Gujarat	0.2	1.8	989954	6054.8	178.6 (0.2)
Haryana	1.0	309.6	519270	20126.5	-41.7 (-0.32)
Himachal Pradesh	0.7	29.9	99327	-76.3	114.9 (1.9)
Jammu Kashmir	0.4	7.7	336537	-10422.0	216.29 (0.9)
Karnataka	0.9	101.6	946431	20238.9	804.7 (1.7)
Kerala	0.7	20.0	554144	9057.8	109.2 (0.4)
Madhya Pradesh	0.8	47.1	1116294	49508.2	-499.3 (-0.8)
Maharashtra	0.8	38.3	1505543	16046.5	1197.7 (1.4)
Orissa	0.2	3.0	598748	19915.8	-659.5 (-1.7)
Punjab	1.0	256.8	724072	46089.7	-755.8 (-3.6)
Rajasthan	0.6	14.3	649470	61793.0	-1552.7 (-1.9)
Tamilnadu	0.7	27.9	590971	56374.9	-1086.6 (-1.6)
Uttar Pradesh	1.0	281.1	2221284	59401.5	493.7 (0.9)
West Bengal	0.8	48.9	723118	57720.8	25.1 (0.01)
India	0.9	119.5	15000000	372225.0	1783.1 (0.4)

Note: Figures in parentheses give values of 't' test.

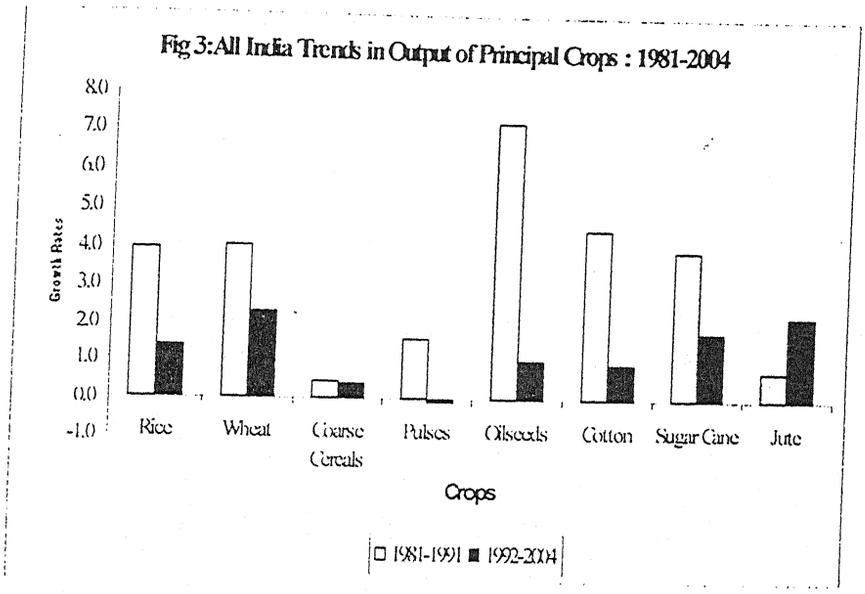
IV. All India Trends in Production, Area and Yield of Major Crops

In this section we analyse trends in production of principal crops at the all India level. Table 3 presents the results for the kinked exponential function on main foodgrains and non-foodgrain crops for the period 1981-2004.

Table 3: Crop wise Compound Annual Growth Rates: All India, 1981-2004

Crops	1980-81 to 1990-91	1991-92 to 2003-04	1980-81 to 2003-04
Rice	3.9 (7.0)	1.4 (3.3)	2.4 (9.7)
Wheat	4.0 (8.7)	2.3 (6.7)	3.0 (15.5)
Coarse Cereals	0.4 (0.5)	0.4 (0.6)	0.4 (1.3)
Pulses	1.6 (2.2)	-0.1 (-0.2)	0.6 (2.1)
Foodgrains	3.2 (6.8)	1.3 (3.8)	2.1 (10.3)
Oilseeds	7.2 (6.3)	1.0 (1.2)	3.5 (6.6)
Cotton	4.5 (3.6)	0.9 (1.0)	2.4 (4.7)
Sugarcane	4.0 (5.8)	1.8 (3.5)	2.7 (9.6)
Jute	0.7 (0.8)	2.2 (3.1)	1.6 (4.4)

Note: Figures in parentheses give value of T test.



During the pre-reform period (1981-91) high growth rates were registered by all crops except coarse cereals, pulses and jute (Fig 3). Thus both commercial and non commercial crops performed well during this period. However, during the post reform period (1991-2004) a sharp decline in growth rates is visible across all the crops, except Jute. The decline was particularly sharp in case of oilseeds followed by cotton among commercial crops. Among cereals the fall in growth rate was more noticeable in case of rice as compared to wheat. Pulses recorded a negative growth rate during the post reform period, while growth rate of output of coarse cereals remained stagnant at 0.4% per annum.

The growth rate of foodgrains output in post reform period has lagged behind population growth resulting in lower per capita availability of foodgrains. Per capita net availability of foodgrains, which had showed a continuous rise form 166 Kg./year in 1981 to 186 kg/year in 1991, came down to 179 kg/year in 2002. In case of pulses the intake has halved from 60 kg/year in 1951 to 34.6 kg/year in 2002. A decline in production of pulses and coarse cereals has serious nutritional implications especially for the poor (Vyas, 1999).

The decline in growth rates has been further probed by the use of the quadratic function results for which are shown in Table 4. The Quadratic function analysis confirms a decelerating trend for all crops, except coarse cereals and jute. Coarse cereal output shows a low but steady growth through out the period, while Jute output growth shows sharp acceleration in the second period.

Table 4: Crop wise Quadratic Function 1980-81 to 2003-04: All India

Dependent	Rsq	F	b0	b1	b2
Rice	0.86	66.14	45226.4	3134.5 (5.1)	-58.5 (2.4)
Wheat	0.93	138.48	33385.5	2337.2 (5.7)	-28.0 (-1.8)
Coarse Cereals	0.08	0.9	29617.2	24.6 (0.1)	4.2 (0.3)
Pulses	0.24	3.38	11003.1	266.8 (1.8)	-7.6 (-1.4)
Foodgrains	0.87	69.7	119339	5731.3 (1.5)	-88.3 (0.6)
Oilseeds	0.75	31.36	6536.88	1461.4 (4.6)	-35.9 (-2.9)
Cotton	0.56	13.18	5579.13	567.8 (2.9)	-13.7 (-1.8)
Sugarcane	0.83	52.87	137434	10883.2 (4.3)	-191.5 (-1.9)
Jute	0.47	9.21	8168.98	-1.5 (-0.1)	6.0 (1.1)

Note: Figures in parentheses give value of T test.

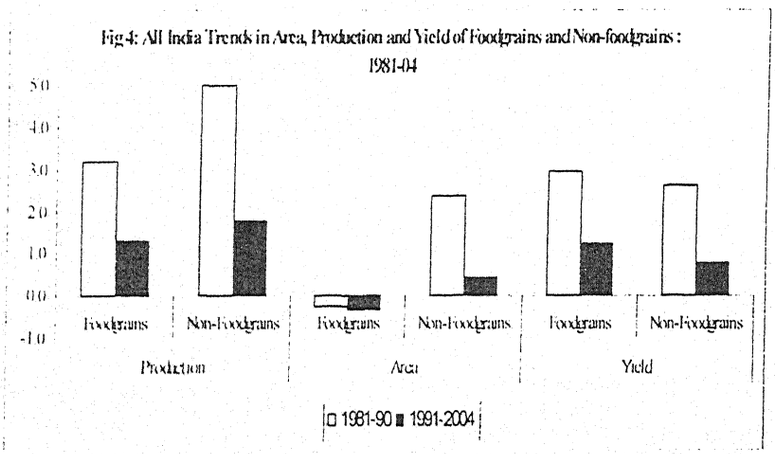
Results of dummy variable regression have been shown in Table 5. The dummy variable shows a negative sign for the shift parameter for all the crops again confirming the declining trend in agricultural production during the last two decades. The shift has occurred in most cases around 1992-03. In case of rice the declining trend had set in the year 1991-92, while in case of wheat shift occurred in 1994-95.

Table 5: Crop wise Estimates of Trend Rates and Possible Year of Shifts in Growth Rates: All India (1980-81 to 2003-04)

Crop	Trend Rate	Shift Parameter	Year Of shift	R-square
Paddy	0.03756 (7.2)	-0.01553 (-1.9)	1991-92	0.918
Wheat	0.03705 (11.7)	-0.009765 (-1.4)	1994-95	0.956
Coarse Cereals	0.004512 (0.6)	-0.0004171 (-0.1)	1992-93	0.084
Pulses	0.01631 (2.6)	-0.0182 (-1.7)	1992-93	0.314
Food grains	0.02911 (7.0)	-0.008947 (-1.4)	1991-92	0.925
Oilseeds	0.06991 (6.9)	-0.05333 (-3.1)	1992-93	0.847
Sugar cane	0.03543 (6.7)	-0.006404 (-0.7)	1992-93	0.915
Cotton	0.04421 (3.7)	-0.03224 (-1.6)	1992-93	0.437

Note: Figures in parentheses give value of T test.

Table 6 gives the trend growth rates in area, production and yield of foodgrains and non-foodgrains through 1981 to 2003-04 based on index numbers taken from *Agricultural Statistics at a Glance* 2004, Ministry of Agriculture, G.O.I. Growth rate of foodgrains output fell sharply from 3.2% per annum in the eighties to 1.3% per annum in the nineties (Figure 4). Growth rates of non-foodgrains remained well above that of foodgrains during both the periods. Area under foodgrains registered a continuous decline throughout the period under study. While in case of non-foodgrains there was a rapid increase in the first period and a much slower increase in the second period. The growth rate of yield of main crops was fairly high in the pre-reform period but fell sharply during the post reform period in case of foodgrains as well as non-foodgrains. Growth rates of yield were higher for foodgrains as compared to non-foodgrains in both the periods. It may be concluded from the above analysis that increase in production of foodgrains was due to increase in yields rather than area, while in case of non-foodgrains both increase in area and yields have contributed to output growth. A comparison of the trends in output and yields also indicates a sharp decline in factor productivity in the post reform period as compared to the pre reform period. Sawant et al (2002) also point out that foodgrain production along with that of oilseeds registered a deceleration due to a decline in yield of these crops while on the other hand there has been a price induced crop diversification in favour of non-foodgrains. It was, however,



felt that the diversification was difficult to sustain unless there was increased investment in technological advancement of these crops.

Table 6: Compound Annual Growth Rates of Area, Production and Yield of Food grains, Non-food grains and Total Principal Crops: All India (1981-2004)

Crop Group	Item	1980-81 to 1990-91	1991-92 to 2003-04	1980-81 to 2003-04
Food grains	Area	-0.2 (-1.2)	-0.3 (-2.1)	-0.3 (-3.8)
	Production	3.2 (6.8)	1.3 (3.8)	2.1 (10.3)
	Yield	3.0 (9.9)	1.2 (5.5)	1.9 (13.4)
Non-Food grains	Area	2.4 (5.4)	0.4 (1.3)	1.2 (6.4)
	Production	5.0 (8.5)	1.8 (4.0)	3.1 (11.1)
	Yield	2.6 (7.7)	0.8 (3.0)	1.5 (9.5)
Total Principal Crops	Area	0.4 (1.9)	-0.1 (-0.7)	0.1 (1.2)
	Production	3.9 (8.2)	1.5 (4.2)	2.5 (11.4)
	Yield	2.8 (9.4)	1.0 (4.6)	1.7 (12.0)

Note: Figures in parentheses give value of 'T' Test.

V. Trends in Foodgrains Production at the State Level

We now analyse the trends in foodgrain production at the state level. Table 7 presents the growth rates in foodgrains output for major states for the two sub-periods, i.e., 1981-90 and 1991-2004.

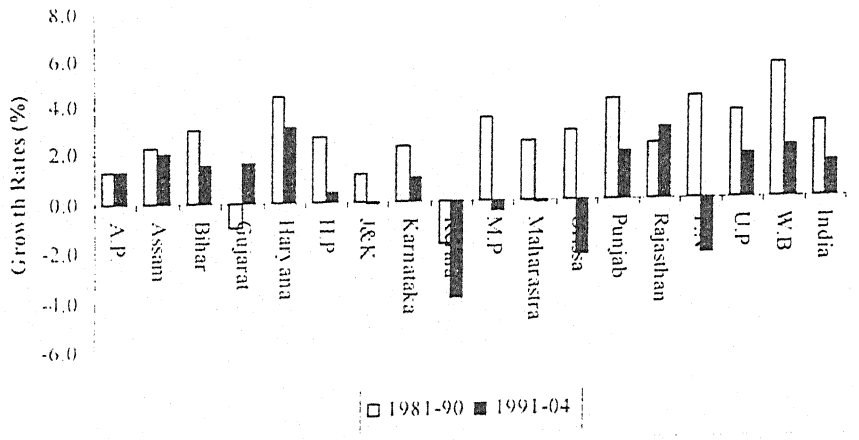
Table 7: Compound Annual Growth Rates of Foodgrains Output for Major States: 1981 to 2004

States	1981-82 to 1990-91	1991-92 to 2003-04	1981-82 to 2003-04
Andhra Pradesh	1.3 (1.4)	1.3 (2.0)	1.3 (3.8)
Assam	2.3 (4.7)	2.1 (5.7)	2.2 (11.9)
Bihar	3.0 (3.4)	1.5 (2.3)	2.1 (6.3)
Gujarat	-1.0 (-0.4)	1.6 (0.8)	0.5 (0.5)
Haryana	4.5 (7.7)	3.1 (7.2)	3.6 (16.0)
Himachal Pradesh	2.7 (2.9)	0.4 (0.5)	1.3 (3.6)
Jammu and Kashmir	1.1 (1.6)	-0.1 (-0.2)	0.4 (1.5)
Karnataka	2.3 (2.0)	1.0 (1.2)	1.5 (3.6)
Kerala	-1.8 (-4.4)	-3.9 (-13.0)	-3.1 (-16.3)
Madhya Pradesh	3.5 (2.6)	-0.4 (-0.4)	1.2 (2.2)
Maharashtra	2.4 (2.0)	-0.1 (-0.2)	0.9 (1.9)
Orissa	2.9 (2.0)	-2.3 (-2.1)	-0.2 (-0.3)
Punjab	4.2 (11.4)	2.0 (7.3)	2.9 (16.1)
Rajasthan	2.3 (1.2)	3.0 (2.1)	2.7 (3.8)
Tamilnadu	4.3 (3.0)	-2.3 (-2.1)	0.4 (0.6)
Uttar Pradesh	3.6 (9.3)	1.8 (6.1)	2.5 (14.4)
West Bengal	5.7 (8.2)	2.1 (4.1)	3.6 (11.2)
India	3.1 (6.7)	1.4 (4.2)	2.1 (10.9)

Source: Computed from data taken from RBI Handbook on Indian Economy.

It is evident from the table that foodgrain output registered a sharp set back in growth rate during the post reform period. At the all India level growth rate of foodgrain output, which stood at 3.1% per annum during 1981-91, fell sharply to 1.4% per annum during the 1991-2004 period. Nearly all states with the exception of Gujarat and Rajasthan show a clear decline in growth rate of foodgrains output during the second period as compared to the first period (fig. 5). The decline in growth rate was very marked in the states of West Bengal (from 5.7% to 2.1%), Punjab (from 4.2% to 2.0%), Uttar Pradesh (from 3.6% to 1.8%), Haryana (from 4.5% to 3.1) and Bihar (3.0% to 1.5%). As many as six states, namely, J&K, M.P, Orissa, Maharashtra, Tamilnadu and Kerala, registered a negative growth in foodgrains output in the nineties. Kerala witnessed a declining trend in foodgrains output in both the periods.

Fig 5: CAGR (%) of Fodgrain output, 1981-2004



For the entire period, Haryana, West Bengal, Punjab, Rajasthan and U.P, registered relatively higher growth (more than 2.5% per annum). Kerala and Orissa registered negative growth rates in foodgrains output. Performance of Gujarat, Jammu & Kashmir, Maharashtra and Tamilnadu was also not satisfactory, all of them registering growth rate of less than 1% per annum. Growth rate of foodgrain output was moderate (between 1% and 2.5% per annum) in the states of Assam, Bihar, Himachal Pradesh, Karnataka and Madhya Pradesh.

In Table 8 we have classifies the states into four categories in terms of growth rates of output during the two decades: high growth category states (having a growth rate of 3.5% per annum and above), middle growth category (having a growth rate between 3.5% and 2% per annum), low growth category (having growth rate below 2% per annum) and states having negative growth rate.

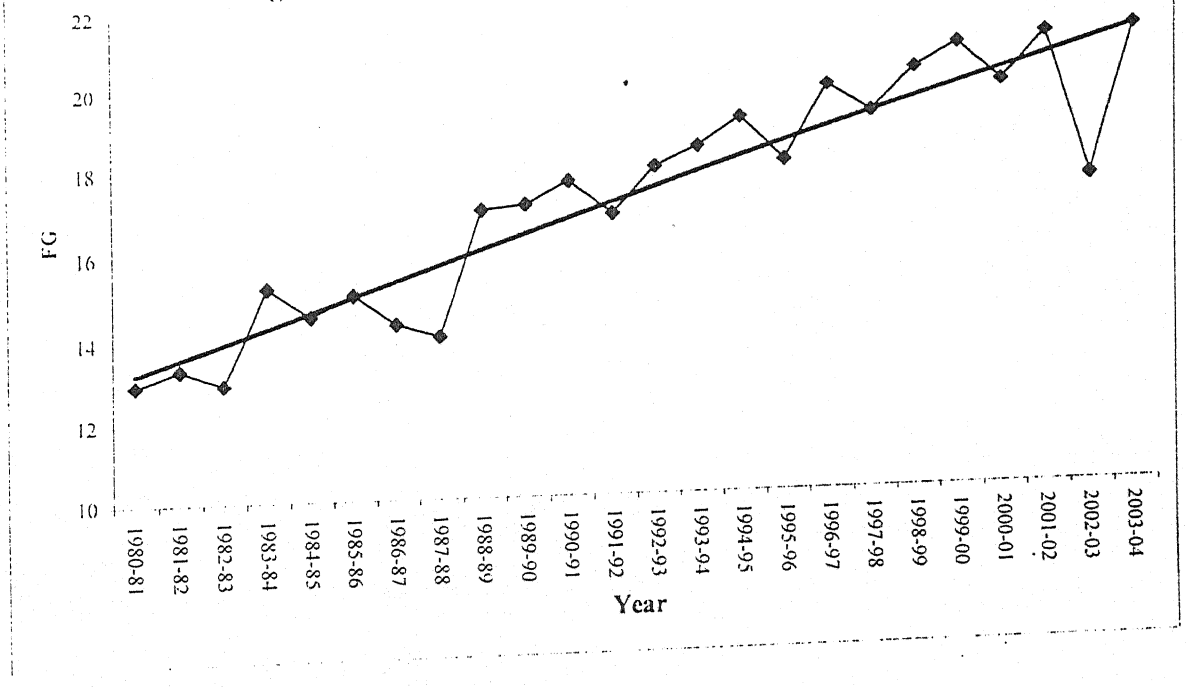
Table 8: Classification of States According to Growth Rate of Foodgrains Output

Category by CAGR	1981-82 to 1990-91	1991-92 to 2003-04	1981-82 to 2003-04
5% to 3.5% (High)	West Bengal, Haryana, T.N, Punjab, Uttar Pradesh, Madhya Pradesh		West Bengal Haryana
3.5 % to 2% (Moderate)	Bihar, Orissa, H.P, Maharastra, Assam, Rajasthan, Karnataka	Haryana, Rajasthan, West Bengal, Punjab, Assam	Punjab, Rajasthan, U.P, Assam, Bihar
Below 2% (Low)	Andhra Pradesh, J & K	U.P, Gujarat, Bihar, Andhra Pradesh, Karnataka, Himachal Pradesh	Karnataka, A.P, H.P, M.P, Maharashtra, Gujarat, J&K
Negative	Gujarat, Kerala	J & K, Maharahtra, M.P, Orissa, T.N, Kerala	Orissa, Kerala, T.N

There were six states in the high growth category in the eighties. None of the states fell in this category in the nineties. Seven states in the eighties and 5 states in the nineties were in the middle growth category. There were only two states in the low growth category during the eighties. Their number swelled to six in the nineties. The number of states with a negative growth rate has increased from two in eighties to six in the nineties.

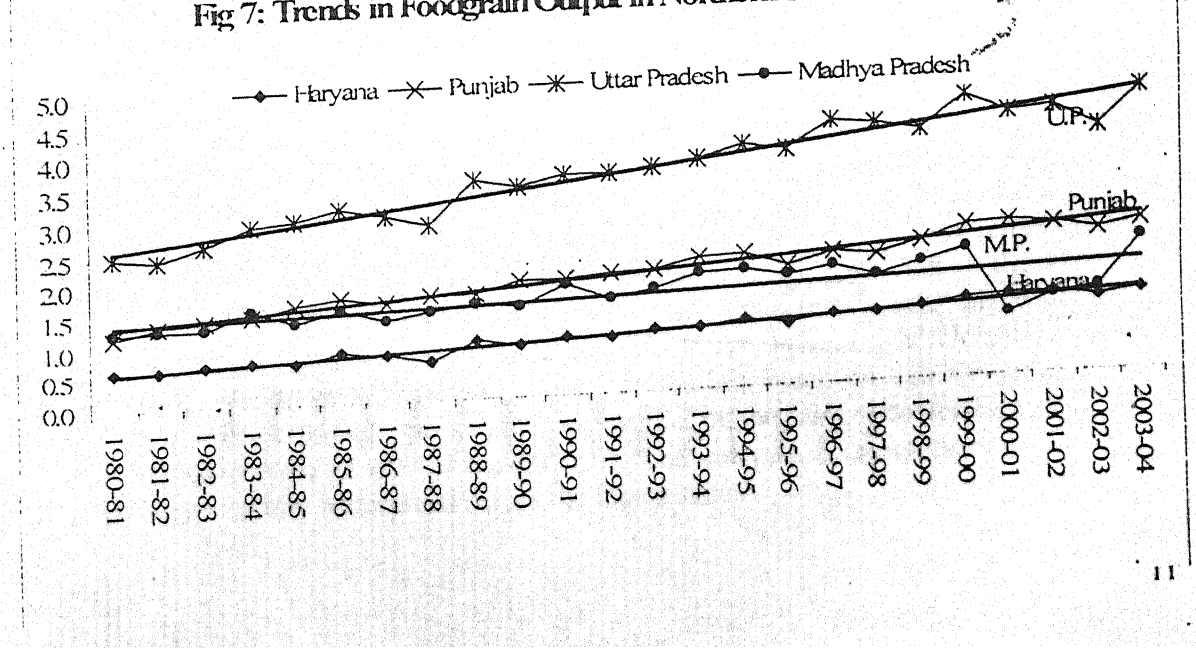
Fig 6 presents the All India trends in foodgrain production for the period 1981-2004.

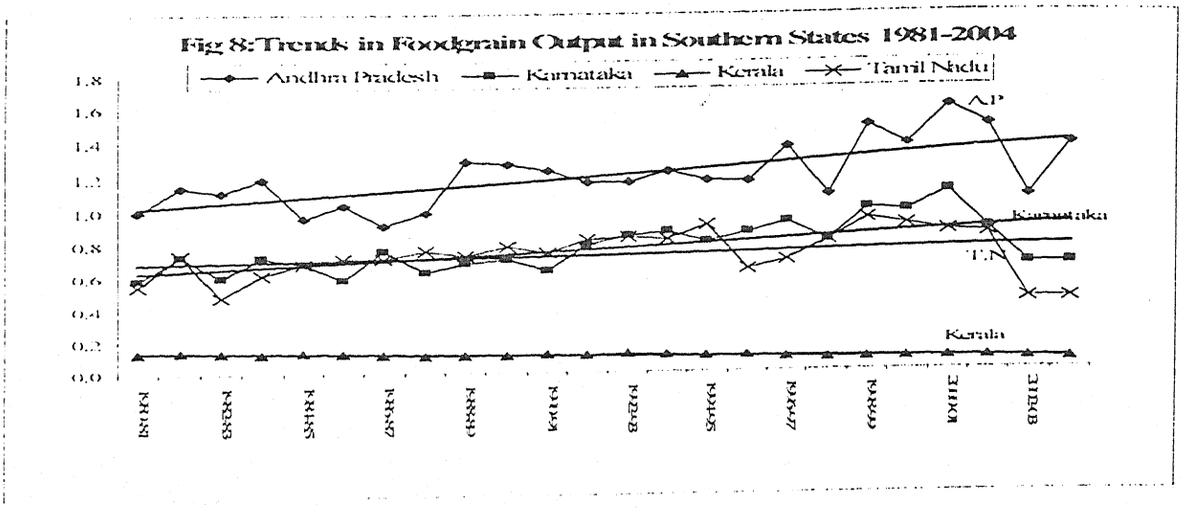
Fig 6: Trends in Foodgrain Output in India 1981-2004

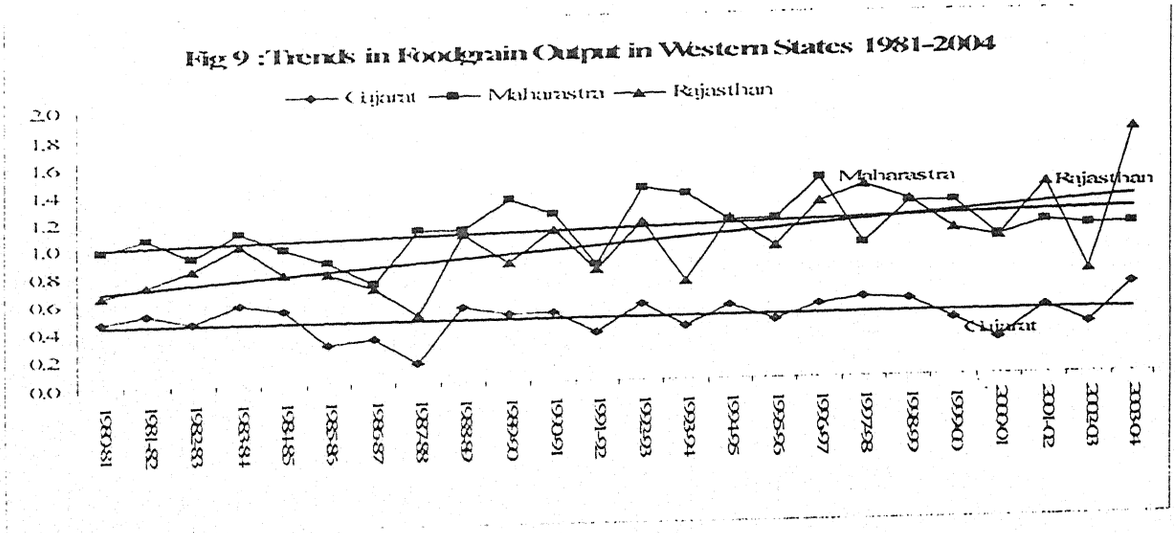


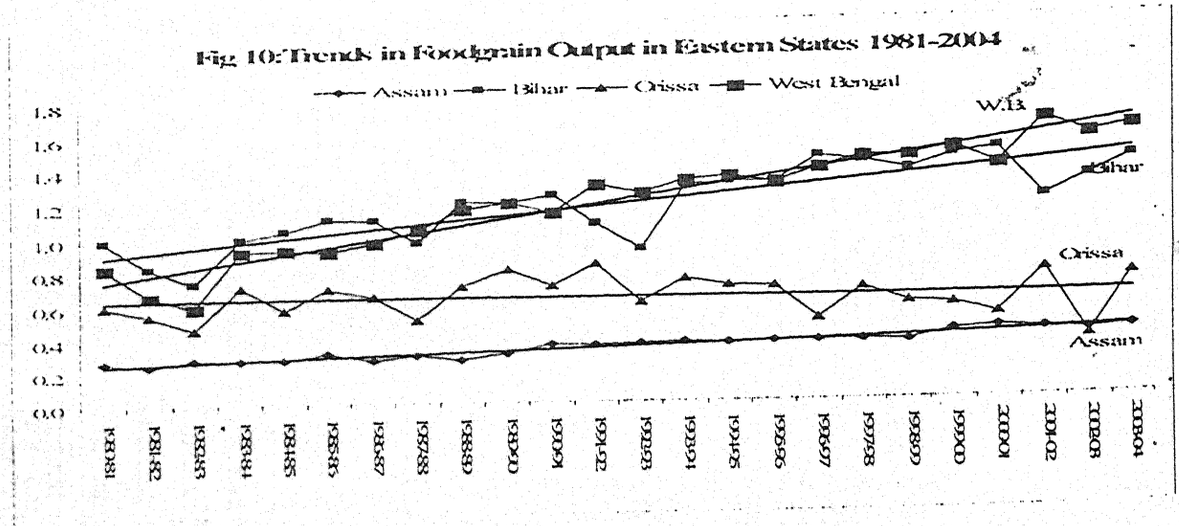
Figures 7 to 10 give region wise picture of trends in foodgrain production during the study period.

Fig 7: Trends in Foodgrain Output in Northern States 1981-2004




Fig 8:Trends in Foodgrain Output in Southern States 1981-2004
Andhra Pradesh
Karnataka
Kerala
Tamil Nadu
AP
Karnataka
T.N
Kerala


Fig 9 :Trends in Foodgrain Output in Western States 1981-2004
Gujarat
Maharastra
Rajasthan
Maharastra
Rajasthan
Gujarat


Fig 10:Trends in Foodgrain Output in Eastern States 1981-2004
Assam
Bihar
Orissa
West Bengal
W.B
Bihar
Orissa
Assam

Looking at the regionwise pattern of growth of foodgrains output, we find that the northern and eastern states perform better than the other two regions and continue to dominate foodgrain production. Southern region performs poorly and so does the western region, where only Rajasthan shows a relatively better performance. Foodgrains production continues to remain confined to the well irrigated regions and limited spread of irrigation facilities to the drylands in the southern and western region has constrained the growth of foodgrains in these regions.

The analysis based on quadratic function confirms deceleration in growth rates of foodgrain output in as many as 13 out of 17 states as well as at the all India level (Table 9). The remaining four states (Andhra Pradesh, Assam, Gujarat and Rajasthan) show acceleration in growth rate in recent years. These states had registered a relatively low growth in foodgrains output in the eighties.

Table 9: Estimates of Quadratic Function on Foodgrains Output: 1981-04

State	Rsq	F	b0	b1	b2
Andhra Pradesh	0.41	7.3	10194.5	123.8 (0.71)	1.4 (0.2)
Assam	0.87	73.0	2448.9	61.0 (2.5)	0.4 (0.4)
Bihar	0.69	23.4	8040.0	402.3 (2.7)	-6.5 (-1.1)
Gujarat	0.04	0.4	4688.2	-89.1 (-0.6)	4.4 (0.7)
Haryana	0.94	158.0	5412.1	350.0 (4.4)	-0.4 (-0.1)
Himachal Pradesh	0.43	8.0	942.8	41.1 (2.3)	-1.0 (-1.4)
Jammu Kashmir	0.17	2.1	1181.1	23.5 (1.7)	-0.7 (-1.3)
Karnataka	0.42	7.6	5457.9	300.1 (2.2)	-7.2 (-1.4)
Kerala	0.95	181.2	1350.8	-20.9 (-3.2)	-0.4 (-1.4)
Madhya Pradesh	0.31	4.8	11105.6	756.8 (2.3)	-22.2 (1.7)
Maharashtra	0.23	3.1	8477.7	420.4 (2.0)	-13.0 (-1.6)
Orissa	0.14	1.8	5226.2	245.3 (1.8)	-10.0 (-1.9)
Punjab	0.95	200.1	11871.9	748.9 (6.7)	-8.4 (-1.9)
Rajasthan	0.43	7.9	7123.5	116.4 (0.4)	6.4 (0.6)
Tamilnadu	0.39	6.8	4729.1	518.3 (3.7)	-19.1 (-3.5)
Uttar Pradesh	0.93	142.2	22940.8	1311.9 (6.0)	-17.5 (-2.1)
West Bengal	0.93	145.2	6212.7	579.9 (5.9)	-7.5 (-1.9)
India	0.87	69.7	119339.0	5731.3 (4.6)	-88.3 (-1.8)

Note: Figures in parentheses give values of 't' test.

We have also used the technique of dummy variable to examine the growth pattern in the pre and post reform periods. The period 1981-82 to 1990-91 has been taken as the pre reform period and the period 1991-92 to 2003-04 represents the post reform period. Dummy variable is given zero value for the pre-reform period, while it takes value one for the post reform period. The results of the exercise are given in Table 10. In this case 10 states out of the 17 states considered show a negative sign for the dummy variable indicating a clear and widespread process of deceleration in growth rate of foodgrain output. States showing acceleration are A.P, Assam, Karnataka, Gujarat and Rajasthan. Thus, the analysis based on dummy variable also confirms the deceleration in foodgrain output drawn earlier on the basis of comparison of growth rates in the two sub-periods as well as quadratic function analysis. It is significant to note that this deceleration is spatially widespread across the Indian states.

Many scholars have tried to identify the year of shift in production trends in Indian agriculture. Kumar (1992) concludes that the year 1981-82 marks a significant break in growth of the primary sector. Dholakia and Dholakia (1993) also find that 1981-82 was a year of significant shift in terms of growth in total factor inputs (TFI) and total factor productivity (TFP). As indicated by them the high growth rates in the sector during 1981-89 was to be attributed to technological progress experienced due to high growth of TFP and not due to an increase in TFI. However, in a detailed study on structural breaks in Indian agriculture Ghosh (2002) points out that the most significant structural break in the post green revolution period had occurred in the year of 1987-88.

We have also made an attempt to ascertain possible year of shift in foodgrain output between 1981-82 and 2003-04. The optimum division of time period is done by comparing the residual sum of squares (RSS). The year with the lowest RSS is taken as the year of shift as done by some scholars earlier (Dholakia 1980, Reddy et. al. 1998). The results are summarized in Table 10.

At the all India level the year of shift in trend line is 1991-92, which coincides with the beginning of economic reforms. In case of as many as twelve states the shift parameter is negative. The negative trend started in Bihar and Punjab earlier around 1987-88. Tamilnadu joined this group in 1989-90 and U.P. in 1990-91. Negative shift started in Haryana, J & K and West Bengal in 1991-92. The negative trend spread to the states of H.P., Karnataka, M.P., Maharashtra, Kerala and Orissa in 1992-93. Among the five states showing acceleration in foodgrains output the shift has taken place around 1988-89 in AP, Assam and Gujarat and around 1989-90 in Karnataka and Rajasthan.

Table 10: Estimates of Trend Rates of Growth and Possible Year of Shifts in Growth Rate of Foodgrains Output for Selected States

State	Trend Rate	Shift Parameter	Optimal Year Of shift	R-square
Andhra Pradesh	-0.007247 (-0.5)	0.02989 (1.7)	1988-89	0.59
Assam	0.01301 (1.4)	0.01226 (1.1)	1988-89	0.86
Bihar	0.04133 (1.9)	-0.02133 (-0.8)	1987-88	0.66
Gujarat	-0.0706 (-1.5)	0.09304 (1.5)	1988-89	0.12
Haryana	0.04282 (6.5)	-0.006277 (-0.6)	1991-92	0.93
Himachal Pradesh	0.02454 (2.6)	-0.014789 (-0.9)	1992-93	0.49
Jammu Kashmir	0.01151 (1.5)	-0.01266 (-0.9)	1992-93	0.14
Karnataka	0.006464 (0.6)	0.02293 (1.5)	1989-90	0.75
Kerala	-0.01866 (-4.4)	-0.01904 (-2.6)	1992-93	0.93
Madhya Pradesh	0.03766 (2.9)	-0.04861 (-2.2)	1992-93	0.34
Maharashtra	0.02272 (1.7)	-0.02057 (-0.9)	1992-93	0.22
Orissa	0.02816 (2.3)	-0.04794 (-2.3)	1992-93	0.23
Punjab	0.06043 (8.3)	-0.03482 (-4.1)	1987-88	0.97
Rajasthan	0.002506(0.1)	0.03605 (1.1)	1989-90	0.48
Tamilnadu	0.04044 (2.9)	-0.03085 (-1.7)	1989-90	0.57
Uttar Pradesh	0.03651 (8.9)	-0.01491 (-2.4)	1990-91	0.95
.West Bengal	0.06005 (7.2)	-0.03706 (-2.8)	1991-92	0.89
India	0.02911 (7.03)	-0.008947 (-1.4)	1991-92	0.93

Note: Figures in parentheses give value of T test.

In short, the analysis reveals that a structural shift has taken in the pattern of agricultural growth in the country as far as the foodgrain economy is concerned between the five year period from 1987-88 to 1992-93. The negative trend had set in the majority of states in the early nineties and has not reversed since then.

VI. Trends in Foodgrains Area and Yield at the State Level

We now examine the trends in area and yield of foodgrains at the state level. Compound growth rates for area and yield of foodgrains in different states have been shown in Table 11. Area under foodgrains has been declining albeit slowly since the eighties at the all India level. Six states in the eighties and nine states in the nineties show an absolute decline in area under foodgrains. The following states show a decline in area under foodgrains in both the periods: A.P., Gujarat, Kerala and Tamilnadu. The states of Bihar, H.P., J & K, Maharashtra and Orissa show a negative trend in foodgrain area during the nineties. Other states show a marginal increase in area under foodgrains during this period. Thus, a clear shift in area away from foodgrain crops has been taking place in the country as a whole and in most of the states.

Table 11: CAGR (%) of Output, Area and Yield of Foodgrains

STATES	Output		Area		Yield	
	1981-82 to 1990-91	1991-92 to 2003-04	1981-82 to 1990-91	1991-92 to 2003-04	1981-82 to 1990-91	1991-92 to 2003-04
Andhra Pradesh	1.3	1.3	-1.9	-1.0	2.9	2.0
Assam	2.3	2.1	0.6	0.1	1.1	1.0
Bihar	3.0	1.5	0.1	-0.1	4.1	3.8
Gujarat	-1.0	1.6	-1.6	-1.6	-2.1	4.2
Haryana	4.5	3.1	-0.5	1.4	4.9	1.8
Himachal Pradesh	2.7	0.4	0.1	-0.3	1.6	0.7
Jammu Kashmir	1.1	-0.1	0.6	-0.2	-0.3	0.5
Karnataka	2.3	1.0	0.3	0.1	-0.1	2.7
Kerala	-1.8	-3.9	-4.1	-5.0	1.3	0.3
Madhya Pradesh	3.5	-0.4	-0.2	0.4	3.4	1.6
Maharashtra	2.4	-0.1	0.2	-0.6	1.2	1.1
Orissa	2.9	-2.3	0.5	-3.1	2.8	-0.2
Punjab	4.2	2.0	1.4	0.7	2.8	1.1
Rajasthan	2.3	3.0	-1.1	1.2	2.8	3.6
Tamilnadu	4.3	-2.3	-1.0	-1.4	3.7	1.5
Uttar Pradesh	3.6	1.8	0.1	0.2	5.1	2.3
West Bengal	5.7	2.1	0.9	0.5	5.0	1.8
India	3.1	1.4	-0.2	-0.1	3.1	2.1

At the all India level, the growth rate of foodgrain yield declined from 3.13 per cent per annum in the eighties to 2.06 per cent per annum in the nineties. Only four states (i.e. Gujarat, J & K, and Karnataka and Rajasthan) show acceleration in growth rate of foodgrain yield during the nineties. As many as thirteen out of seventeen states studied show a decline in the growth rate of foodgrain yields. In Orissa a negative growth rate of yield was recorded in the nineties. Thus, both decline in area and decline in yield have contributed to the deceleration in foodgrain output

during the nineties. This is a cause of concern in as much as future growth in agricultural output has to be secured through increase in productivity rather than area. These trends are also indicative of the declining factor productivity in Indian agriculture.

VII. Growth Rate of Output of Major Crops at the State Level

We may now examine the trends in the growth of output of major crops at the state level. For consideration of space ant time analysis is confined to four crops only, namely, rice, wheat, sugarcane and oilseeds.

In case of rice, all states register a decline in growth rates in the post reform period with the exception of H.P and Haryana (Table 12). M.P and Orissa register negative growth rates in the second period, while Kerala observes a negative trend in both the periods. The main rice producing states of West Bengal, U.P, A.P, Punjab, T.N, Bihar, Orissa and M.P registered high growth rates in the first period, while in the second period they observe a marked slow down.

In case of wheat output a slow down is registered in the at the all India level in the nineties (Table 13). All the major wheat producing states (i.e. U.P, Punjab, Haryana and M.P experience high growth rates in the first period, followed by a deceleration in the second period. Rajasthan's performance is above average in both periods. Among the other states Karnataka, Maharashtra, W.B. and A.P register high growth rates in the second period. Assam, Orissa and Tamilnadu record negative growth rates in wheat output in both periods.

Table 12: Statewise Growth Rates of Rice Output: 1981-2003

States	1981-82 to 1990-91	1991-92 to 2002-03	1981-82 to 2002-03
Andhra Pradesh	2.7 (2.3)	0.9 (1.0)	1.7 (3.6)
Assam	2.5 (4.5)	2.3 (5.1)	2.4 (10.9)
Bihar	2.3 (1.5)	1.9 (1.5)	2.1 (3.4)
Gujarat	2.9 (1.2)	2.6 (1.4)	2.7 (3.0)
Haryana	3.7 (4.3)	4.3 (6.1)	3.5 (11.8)
Himachal Pradesh	-0.3 (-0.2)	1.5 (1.5)	0.7 (1.5)
Karnataka	2.5 (2.2)	2.1 (2.3)	2.3 (5.1)
Kerala	-2.0 (-4.6)	-3.7 (-10.7)	-3.0 (-15.4)
Madhya Pradesh	5.9 (2.0)	-6.9 (-2.9)	-1.3 (-1.0)
Maharashtra	0.7 (0.6)	0.2 (0.2)	0.4 (1.0)
Orissa	5.1 (3.3)	-1.7 (-1.4)	1.2 (1.7)
Punjab	6.1 (10.1)	2.5 (5.0)	4.0 (13.1)
Rajasthan	0.5 (0.1)	1.0 (0.4)	0.8 (0.6)
Tamilnadu	4.1 (4.0)	0.8 (0.9)	2.2 (5.1)
Uttar Pradesh	5.9 (6.8)	1.4 (2.0)	3.4 (8.0)
West Bengal	6.3 (8.0)	2.1 (3.3)	3.9 (10.3)
India	3.9 (6.8)	1.4 (3.0)	2.5 (9.4)

Note: Figures in parentheses give values of 't' test.

Table 13: Statewise Growth Rates of Wheat Output: 1981-2003

States	1981-82 to 1990-91	1991-92 to 2002-03	1981-82 to 2002-03
Andhra Pradesh	-3.6 (-1.6)	2.9 (1.5)	0.1 (0.1)
Assam	-1.9 (-1.9)	-1.5 (-1.9)	-1.7 (-4.3)
Bihar	4.9 (8.3)	2.0 (4.1)	3.2(11.5)
Gujarat	-0.9 (-0.3)	0.3 (0.1)	-0.2 (-0.2)
Haryana	5.7 (12.9)	3.5 (9.8)	3.5 (21.3)
Himachal Pradesh	4.4 (2.3)	-0.7 (-0.4)	1.5 (1.9)
Karnataka	-4.1 (-2.4)	4.3 (3.1)	0.6 (0.8)
Kerala	N.A	N.A	N.A
Madhya Pradesh	6.0 (4.0)	1.0 (0.8)	3.1 (4.9)
Maharashtra	-1.1 (-0.6)	3.2 (2.2)	1.4 (1.8)
Orissa	-19.5 (-3.8)	-15.8 (-3.8)	-17.4 (-8.7)
Punjab	3.9 (9.0)	1.9 (5.3)	2.8 (13.5)
Rajasthan	4.4 (3.2)	3.9 (3.5)	4.1 (7.7)
Tamilnadu	-12.4 (-4.5)	-4.1 (-1.2)	-8.8(-5.6)
Uttar Pradesh	3.7 (9.5)	2.4 (7.8)	3.0 (17.9)
West Bengal	0.3 (0.2)	3.8 (3.4)	2.3 (4.0)
India	4.0 (8.4)	2.4 (6.4)	3.1 (15.4)

Note: Figures in parentheses give values of 't' test.

Table 14: Growth Rates of Sugarcane Output: 1981-2003

States	1981-82 to 1990-91	1991-92 to 2002-03	1981-82 to 2002-03
Andhra Pradesh	1.0 (0.9)	3.8 (4.1)	2.6 (5.5)
Assam	-2.4 (-2.7)	-4.8 (-6.7)	-3.8 (-10.2)
Bihar	6.1 (5.1)	-2.7 (-2.8)	1.1 (1.6)
Gujarat	6.3 (6.3)	3.4 (4.1)	4.6 (10.9)
Haryana	3.6 (4.0)	1.4 (1.9)	3.5 (6.2)
Himachal Pradesh	-5.1 (-1.9)	12.4 (5.6)	4.8 (3.3)
Karnataka	5.8 (5.9)	5.0 (6.2)	5.4 (13.7)
Kerala	0.2 (0.1)	-4.1 (-2.6)	-2.2 (-2.9)
Madhya Pradesh	1.2 (1.1)	2.6 (2.9)	2.0 (4.5)
Maharashtra	2.7 (2.1)	3.6 (3.6)	3.2 (6.5)
Orissa	-4.3 (-1.6)	-10.1 (-4.7)	-7.6 (-7.0)
Punjab	1.7 (1.2)	2.8 (2.4)	2.3 (4.1)
Rajasthan	-0.9 (-0.4)	-5.3 (-2.8)	-3.4 (-3.6)
Tamilnadu	4.3 (4.1)	3.2 (3.8)	3.7 (8.9)
Uttar Pradesh	4.3 (7.4)	1.5 (3.1)	2.7 (9.8)
West Bengal	-3.6 (-1.5)	7.4 (3.8)	2.6 (2.4)
India	3.7 (6.7)	2.5 (5.7)	3.0 (13.6)

Note: Figures in parentheses give values of 't' test.

Table 15: Growth Rates of Oilseeds Output: 1981-2003

States	1981-82 to 1990-91	1991-92 to 2002-03	1981-82 to 2002-03
Andhra Pradesh	9.0 (5.4)	-4.2 (-3.0)	1.6 (1.6)
Assam	3.4 (5.2)	-1.1 (-2.1)	0.8 (2.4)
Bihar	2.5 (2.6)	0.0 (0.0)	1.1 (2.8)
Gujarat	1.7 (0.4)	2.5 (0.7)	2.2 (1.3)
Haryana	19.2 (4.9)	-5.3 (-1.7)	3.5 (2.7)
Himachal Pradesh	0.3 (0.2)	5.5 (3.6)	3.3 (4.1)
Karnataka	8.9 (7.2)	-3.1 (-3.1)	2.1 (2.6)
Kerala	3.1 (1.0)	-13.5 (-5.1)	-6.3 (-4.0)
Madhya Pradesh	15.4 (9.1)	3.9 (2.8)	8.9 (9.8)
Maharashtra	4.6 (2.8)	3.7 (2.8)	4.1(6.4)
Orissa	0.9 (0.4)	-17.6 (-9.5)	-9.5 (-7.1)
Punjab	3.1 (0.8)	-0.7 (-0.2)	1.0 (0.6)
Rajasthan	17.2 (9.50	1.0 (0.7)	8.0 (7.1)
Tamilnadu	6.4 (5.1)	-1.3 (-1.3)	2.0 (3.2)
Uttar Pradesh	-0.9 (-0.6)	-0.5 (-0.4)	-0.7 (-1.2)
West Bengal	10.8 (9.4)	0.0 (-0.1)	4.7 (6.3)
India	7.4 (6.5)	0.5 (0.5)	3.5 (6.0)

Note: Figures in parentheses give values of 't' test.

Sugarcane also registers a slow down in output growth in the post reform period at the India level but the experience is mixed at the state level (Table 14). Among the four maj sugarcane producing states, sharp deceleration is registered in U.P. and Tamilnadu, whi Maharashtra and A.P experienced higher growth rates in the second period. Among other stat Gujarat, Haryana and Bihar show lower growth rates in the second period, while W.B., Pun and M.P register higher growth rates in the second period.

Oilseeds production witnessed a major slow down in the post reform period. T deceleration has occurred in all states except Gujarat and H.P. (Table 15). All the major oilse producing states (M.P, Gujarat, A.P, Rajasthan, Maharashtra and Karnataka) except Gujarat ha registered a major slow down in the post reform period. U.P has registered a negative trend oilseeds output in both the periods.

VIII. The Impact of Declining Public Investment on Agricultural Growth

The slow down of agricultural growth needs an in depth analysis of its causes, wh cannot be attempted in the short span of this article. However, a reference needs to be made the decline in public investment in agriculture and rural infrastructure, which is regarded as most important factor for slow down of agricultural growth in the post reform per (Thamarajsakhi 1999, Bhalla 2000 and 2001; Balakrishnan 2000, Chand, 2000, Sawant et 2002, Rao 2003). The decline in public investment in its turn is a result of financial crisis fa by the centre as well as the state governments. As the *Mid Term Review of the Ninth Plan* observed that the financial crisis has resulted in: (a) crowding-out of public agricultu investment in irrigation and roads and expenditure on technological upgrading, (b) 'limi

allocation for maintenance of canals and roads, and (c) slower expansion of rural electrification (Planning Commission 2000).

The share of agriculture in total gross capital formation (GCF) had come down from 15.4 per cent in 1980-81 to about 8 per cent in 2001-02 and that as a percentage of GDP it has declined from 3.5 in 1980-81 to 1.6 in 2001- 02 (Planning Commision 2005). Public sector GCF in agriculture and allied sectors has declined in the last two decades from Rs. 7,300 crore in 1980-81 to Rs. 4,658 crore in 2001-02. Though private investment in agriculture has been on the rise during the last two decades, yet it was not able to compensate for the rising cost of production on account of greater capital intensity of agriculture during the period and lower profitability due to depressed domestic and world prices.

Ramesh Chand finds that the level of agricultural productivity and output growth rates are significantly related to the level of fixed investment in different states (Chand, 2000). According to his estimates public investment in agricultural sector, in constant 1980-81 prices, has declined from Rs 6395 crores in the eighties to Rs 5319 crores in the nineties at the all India level. Public investment in agriculture in real terms has declined in all states except Gujarat, J. & K, Karnataka, Kerala and Rajasthan (Table 16). Using multiple regression analysis Chand found that the impact of public investment on the growth of agricultural output was not significant, but when the sum of public and private investments was used as one variable it showed significant impact on inter state variations in growth rates of NSDP agriculture (Chand, 2000, p. 53).

Table 16: Statewise Capital Expenditure by Government on Agriculture and Allied Heads at 1980-81 Prices

STATES	Capital Expenditure (Rs crore/year)			Index 1980-90/ 1974-79	Index 1990-97/ 1980-90
	1974-79	1980-90	1990-97		
Andhra Pradesh	202	313	306	154.95	97.76
Assam	43	104	88	241.86	84.61
Bihar	166	353	164	212.65	46.45
Gujarat	229	276	394	120.52	142.75
Haryana	76	132	117	173.68	88.63
Himachal Pradesh	23	35	29	152.17	82.85
J.K.	111	154	192	138.73	124.67
Karnataka	169	233	280	137.86	120.17
Kerala	80	117	122	146.25	104.27
Madhya Pradesh	184	417	305	226.63	73.14
Maharashtra	727	1148	1016	157.90	88.50
Orissa	118	239	193	202.54	80.75
Punjab	354	448	314	126.55	70.08
Rajasthan	136	203	227	149.26	111.82
Tamilnadu	90	97	94	107.77	96.90
U.P.	585	1045	899	178.63	86.02
West Bengal	107	111	102	103.73	91.89
India	4383	6395	5319	145.90	83.17

Source: Ramesh Chand (2000).

However, as Chand points out the factors other than investment, such as land reforms and institutional and technological factors also have a powerful bearing on agricultural development. This is amply demonstrated by the experience of West Bengal, which has experienced high growth rates following successful land reforms.

The Mid Term Appraisal of the Ninth Plan while analyzing causes of slow down in agricultural growth points out that the rising level of subsidies for power, water, fertilisers and food are eating into public sector investments in agriculture, besides inducing inefficient use of scarce resources, such as water (Planning Commission 2000). The document also draws attention to the fact that agriculture has seen much less reform than other sectors as it is still constrained by central and state regulations that limit movement and intra-state trade, public procurement, and canalization of trade. Similarly the growth of agro-processing industries has been constrained by various controls. Slackening of demand for foodgrains is also believed to have adversely affected output growth of foodgrain crops. The sector has also not seen a major breakthrough in agricultural technology after the introduction of the green revolution technology. Productivity deceleration was identified as an underlying factor responsible for a decline in agricultural output. This concurred with a downturn in world prices, which impacted domestic farm prices more than in earlier decades because of greater openness. The consequence was that farm incomes became more variable and decelerated more than output in many cases (Planning Commission 2005). Rao (2003) also points out that the slow down in agriculture growth in the post reform period despite a favourable macroeconomic environment is due to the neglect of reforms such as removal of restrictions on domestic trade and processing, stepping up of public investment in agriculture and infrastructure development, which directly affects agriculture. Public investment in agriculture has to be broadened and deepened to make the process of diversification sustainable (Sawant et al, 2002).

Vyas (2001) is of the opinion that the main ingredients of a reform agenda in agriculture should incorporate an acceleration of the process of liberalisation in domestic markets along with un-freezing the lease market. Also the agricultural price support and procurement system needs to be revamped. PDS has to be made more efficient at the gross root level while the input subsidies need to be phased out gradually. Finally the export potential of the sector also has to be further tapped through effective policy changes.

VIII. Conclusion

Our analysis indicates that the economic reforms have failed to generate the necessary conditions to give a boost to agriculture produce in general or the commercial crops in particular. On the contrary, the growth rates of agricultural output and productivity particularly that of foodgrains have registered a sharp decline since the early nineties. Thus, the gains foreseen through the globalization measures remain largely unrealized as the necessary preconditions have not been created.

The deceleration in agricultural growth rates in the post reform period is a matter of serious concern for the Indian economy, as a downtrend in this sector will have a depressing effect on the whole economy. This is also likely to aggravate the problems of rural poverty and unemployment and poses a threat to the national objective of food self-sufficiency. Corrective and timely measures are urgently called for reversing the downward trend in agricultural growth.

First and foremost is the need for stepping up investment in agriculture and rural infrastructure. Increasing public sector investment is likely to lead to crowding in of private sector investment as well. Investment in particular is required in the field of irrigation and water

management and rural roads. Power supply in the rural areas needs to be improved. Farmers should also be supported by adequate provision of institutional credit, streamlining of procedures and cutting down the red tape. Freeing of land lease market would help marginal and small farmers to improve viability of their holdings and improve production efficiency. Ceiling on land, however, needs to be retained, despite pressure by certain sections to abolish it.

To maximize the gains from the opportunities provided by liberalization and freeing of trade in agriculture, the process of economic reforms in agricultural needs to be speeded up through measures like introduction of forward trading, removal of barriers to internal trade and processing of agricultural commodities. There is a need to design a more proactive policy to promote agricultural exports and create necessary infrastructure in processing, marketing and grading, warehousing and transport of agricultural produce. Large investments are required in agricultural research and bi-technology to ensure higher agricultural growth and increase competitiveness of agricultural produce. Institutional measures are required to ensure percolation of gains from liberalization to the small and marginal farmers, as the market driven process has an inherent bias towards rich farmers.

To conclude, the process of economic reforms has largely bypassed the agricultural sector in the absence of a well thought of policy frame for the development of the sector. It is high time that the continued neglect of the agricultural sector is stopped and its development is given the importance that it deserves. The prosperity of the large rural masses of the country and development of other sectors of the economy are closely linked to the development of the agricultural sector.

REFERENCES

Balakrishnan, Pulapre (2000), "Agriculture and Economic Reforms – Growth and Welfare" *Economic and Political Weekly,* Vol. 35, No.14, pp 1143

Bhalla, G.S. and Gurmail Singh (1997), "Recent Developments in Indian Agriculture: A State Level Analysis," *Economic and Political Weekly,* Vol. 32, No.13.

Bhalla, G.S. (2000), "Political Economy of Indian Development in the 20th Century: India's Road to Freedom and Growth," Presidential Address, 83rd Conference Indian Economic Association, *Indian Economic Journal*, Vol. 48, No. 3.

Chand, Ramesh (2000), *Emerging Trends and Regional Variations in Agricultural Investments and Their Implications for Growth and Equity,* Policy Paper 11, National Centre for Agricultural Economics and Policy Research, New Delhi.

Dev, S. Mahendra (1987), "Growth and Instability in Foodgrain Production – An Inter-state Analysis," *Economic and Political Weekly,* Vol. 22, No.39.

Dholakia, R.H and B.H Dholakia (1993), "Growth of Total Factor Productivity in Indian Agriculture", *Indian Economic Review*, Vol. 28, No. 1.

Ghosh, Madhusudhan (2002), "Trends, Random Walks and Structural Breaks in Indian Agriculture, *Indian Journal of Agricultural Economics*, Vol. 57, No. 4.

Gulati, Ashok (1990), "Fertiliser Subsidy: Is the Cultivator Net Subsidised?" *Indian Journal of Agricultural Economics*, Vol. 45, No 1.

Planning Commission (2001), *Mid-Term Appraisal of Ninth Five Year Plan,* New Delhi.

_____(2005), *Mid-Term Appraisal of Tenth Five Year Plan,* New Delhi.

Rao, C.H. Hanumantha (2003), "Reforms Agenda for Agriculture," *Economic and Political Weekly,* Vol. 38, No.7.

_____ (1994), "Reforming Agriculture in the New Context", *Economic and Political Weekly,* Vol. 29, No.16.

Rao, V.M (1994), "Agriculture and Liberalisation: Some Implications for Development Policies", *Economic and Political Weekly,* Vol. 29, No.16.

Sawant, S.D. and C. V. Achuthan (1995), "Agricultural Growth Across Crops and Regions-Emerging Trends and Patterns," *Economic and Political Weekly*, Vol.30, No.12.

Sawant, S.D. (1997), "Performance of Indian Agriculture with Special Reference to Regional Variations," *Indian Journal of Agricultural Economics*, Vol. 52, No.3, July-Sept.

Sawant, S.D Vaidehi Daptardar and Dandhya Mhatre (2002), "Capital Formation and Growth in Agriculture", *Economic and Political Weekly,* Vol. 37, No.11, pp 1068

Singh, I.J., K.N. Rai and S.C. Karwasra (1997), "Regional Variations in Agricultural Performance in India," *Indian Journal of Agricultural Economics*, Vol. 52, No. 3, July-Sept.

Vyas, V.S. (2001), "Agriculture: Second Round of Economic Reforms", *Economic and Political Weekly,* Vol. 36, No.20.

Thamarajakshi, S (1999), "Agriculture and Economic Reforms," *Economic and Political Weekly*, Vol. 34, No. 33.

ACHIEVING FOUR PERCENT GROWTH RATE IN INDIAN AGRICULTURE : POSSIBILITIES AT STATE LEVEL

By

RAMESH CHAND

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

ACHIEVING FOUR PERCENT GROWTH RATE IN INDIAN AGRICULTURE: POSSIBILITIES AT STATE LEVEL*

Ramesh Chand
Acting Director
National Centre for Agricultural Economics and Policy Research
Pusa, New Delhi

I
INTRODUCTION

Performance of agriculture sector in the country in the recent years has turned out to be quite dissatisfactory because of sharp deceleration in growth rate of agricultural output. Ministry of Finance, Planning Commission, and office of Prime Minister are emphasising concerted measures to address poor growth rate in agriculture, partly because poor growth rate has serious implications for large percent of India's population that depends upon agriculture for livelihood, and partly because poor growth of agriculture affects growth of overall economy. There are apprehensions that high growth rate in non agriculture sector alone would not help India to realise high growth rate in total economy if agriculture continues to remain in low growth trap. Thus, there is lot of concern to raise growth rate in agriculture.

What is the growth rate in agriculture that India is aiming for? In official quarters it is 4 percent annual growth rate. Both, National Agriculture Policy 2000 and 10th Five Year Plan, aim at this growth rate. This paper examines the feasibility of attaining four percent growth in agriculture. How does this growth rate fare with historical growth rate in Indian agriculture? What are the sources of growth rate in agriculture? Why growth rate has decelerated in recent years? When and where this deceleration started? These are the other questions addressed in the paper.

The remaining paper is organized into four sections. The Second section comments on some methodological issues concerning growth rates in agriculture. The Third section discusses growth experience since 1950-51 and examines if there is deceleration in growth rate in the recent years. The Fourth section analyses the prospects for realising 4 percent growth rate in Indian agriculture.

II
METHODOLOGICAL ISSUES

Lot of confusion and disagreement about growth rate of agriculture results from definition of agriculture followed by various researchers. Agriculture sector in India at broad level is taken to include crop, livestock, fisheries and forestry. Out of these, crop and livestock together are often termed as agriculture or agriculture proper. Some

---

* Paper submitted for National Seminar on Agricultural Growth in the Post Reforms Period: Regional Perspectives, March 27-29, 2006, Lucknow

Some of the material used in this paper is taken from Demand for Urea Towards 2011, Research Report NCAP (01)/2005, September 2005, by Ramesh Chand, NCAP, New Delhi.

researchers use broad definition of agriculture, some include only crop and livestock in agriculture while some use index of production of principal crops to designate agriculture. There is a need to bring some clarity in relation to use of different concepts of output to have proper understanding about growth of agriculture.

Index number of principal crops prepared by Directorate of Economics and Statistics has been widely used to represent growth rate in agriculture though it clearly and explicitly implies that livestock output, whose share has continuously risen in the agriculture output for quite long, is not included in it. This index has turned inadequate for representing even crop sector. The reason is that 46 crops covered in the index do not include large segment of fruits and vegetables. While potato, onion, banana, cashewnut, tapioca and sweet potato are included, the index excludes all fresh vegetables and fruits, except banana, which represent dynamic horticulture sector of India. It is worth mentioning that during 1990-91 to 2000-01 share of fruits and vegetables in value of crop output has increased from 18 percent to 23 percent. Therefore exclusion of important fruits and vegetables, as is the case with the index number of principal crops, results in under-estimation of growth rate of crop sector in the said period. One way to overcome this limitation is to use data on value of crop sector at constant prices as that includes value of output of fruits and vegetables also.

Another limitation of agriculture output data is that due to use of common input in crop and livestock activities separate estimates of value added or GDP in crop sector and that in livestock sector are not available. Thus, separate growth rate for these two sub sectors can be obtained only in respect of value of output and not for value added output.

Keeping these characteristics of data in mind this paper computes all India growth rate for (a) GDP agriculture which includes crop and livestock (b) GDP fishery (c) Value of output of crops, livestock, horticulture crops and non horticultural crops and (d) physical production of important crops/groups.

Sources and Feasibility of Attaining Four Percent Growth

It is hypothesized that in the medium term there are four sources of output growth as follows:

(1) Fertiliser
(2) Irrigation
(3) Crop diversification from foodgrains to high value crops
(4) Total factor productivity (representing effects of technology, infrastructure, better management etc.).

Considering output as a function of above four factors output growth equation was expressed as:

$$\frac{dY}{Y} = E_Y^F \frac{dF}{F} + E_Y^I \frac{dI}{I} + E_Y^D \frac{d(YD)}{Y} + \dot{TFP} \qquad \text{.....1}$$

Where

$\frac{dY}{Y}$ = Rate of growth in output

E_Y^F = Elasticity of crop output with respect to fertilizer

E_y^I = Elasticity of crop output with respect to irrigation

E_Y^D = Elasticity of crop output with respect to diversification of area away from foodgrains

$\frac{df}{f}$ = Rate of growth in fertilizer

$\frac{dI}{I}$ = Rate of growth in irrigation

$\frac{d(YD)}{YD}$ = Rate of growth in output due to area shift

$\dot{T}FP$ = Growth rate in TFP

Equation 1 can be re-expressed to know what growth in specific factors would be needed to attain specified level of growth rate in output. For instance, using empirical estimates or scenario estimate for growth that is feasible through irrigation, TFP and diversification one can compute required growth in fertilizer that would achieve specified growth in output, as follows:

$$\frac{dF}{F} = \left[\frac{dY}{Y} - E_Y^I \frac{dI}{I} - E_Y^D \frac{dYD}{Y} - \dot{T}FP\right] / E_Y^F \quad \text{.....2}$$

Similarly, equation (2) can be used to construct other scenarios for growth required in irrigation or TFP or diversification to attain 4 percent output growth per year. To arrive at that the study estimated growth rate in output achievable through various factors and by multiplying elasticity of crop output with respect to the concerned variables with plausible growth rate in that variable.

As mentioned above the exercise involves estimation of elasticities, future growth in irrigation, diversification and TFP. Elasticities of crop output with respect to irrigation and fertilizer were obtained from estimated production function. The production function was estimated for each state using time series data on value of crop output expressed in 1993-94 prices, fertilizer expressed in quantity of NPK, area under irrigation, rainfall and some other variables considered relevant. Value of crop output was used as dependent variables and all production functions were estimated after log linear transformation of raw data. Only statistically significant coefficients were used to choose coefficients of elasticities.

As it is well known, Indian agriculture has tremendous diversity across regions in terms of productivity levels already attained, growth potential, irrigation potential and resource endowment. Because of these vast regional variations, national level exercise on sources of growth does not take into account region specific characteristics. Therefore, output growth exercise was carried out at state level with a view to find feasible growth at state level to attain 4 percent growth at national level.

III
HISTORICAL AND RECENT GROWTH RATES AT NATIONAL LEVEL

Agricultural production over time is affected by interacting influences of technological, infrastructural, and policy factors. After mid 1960s, Indian government started intervening in agriculture sector to create favourable environment for exploitation of technological potential. This was done by creating enabling infrastructure through public investments and by policy changes affecting agricultural marketing, production, processing and trade. During the decade of 1980s public investments in agriculture started falling. Despite this decline, output of agriculture sector showed higher growth rate compared to the previous three decades (Table 1). This could be made possible by spread of modern technology to wider areas, increase in crop intensity, crop diversification, increased use of technology enhancing input use driven by market forces and policy support. The decade also witnessed some improvement in terms of trade in favour of agriculture.

During the decade of 1990s declining trend in public sector investment that set in year 1979-80 continued for most part of the decade. However, terms of trade were kept favourable to agriculture sector during 1990s by hiking level of cereal prices through government support, trade liberalization, exchange rate devaluation and disprotection to industry. Several researchers felt that as economic reforms focused mainly on price factor and ignored infrastructure and institutional changes the overall impact on growth of agricultural sector has not been favourable. This argument is supported by citing deceleration in output of agriculture sector after reforms were started in the year 1991 (Mujumdar 2002, Bhalla 2002, Kumar 2002). There is a particular concern about the decline in public sector investments in agriculture. Several studies have shown public investments have strong effect on agricultural productivity and growth in India (Chand 2001; Gulati and Bathla 2001; Shangen et. al. 1999).

Our estimates for decadal growth rates showed that total and agricultural and non agricultural GDP followed acceleration during the reform decade (Table 1). The increase was modest for agricultural sector but quite large for non agricultural sector. Within agriculture, output of crop sector showed better growth during reform whereas output of livestock showed deterioration. Further, within crop sector, growth rate of output of horticulture sector (fruits and vegetables) during the decade of economic reforms turned out to be more than double as compared to the pre reform decade. It is worth noting that during the reforms output of horticultural sector increased annually by about 6 percent which is double the growth rate in total crop output. Excluding fruit and vegetables, output of crop sector showed a decline in growth rate to the level of 2.26 percent during

1990s as compared to 2.48 percent during 1980s. Likewise, GDP of fishery sector also witnessed setback in growth rate during the reforms.

Table 1: Growth rates in output of economy and agriculture sub sectors at 1993-94 prices

	GDP				Value of output			
Period	Total	Non agriculture	Agri-Culture	Fishing	Live-stock	Crop sector	Fruit/ Veg	Crops other than fruit/veg
1950-51 to 1959-60	3.68	4.91	2.93	5.79	1.42	3.06	0.56	3.44
1960-61 to 1969-70	3.29	5.00	1.27	4.00	0.41	1.70	5.82	1.09
1970-71 to 1979-80	3.45	4.72	1.94	2.90	3.92	1.79	2.88	1.55
1980/81 to 1989-90	5.38	6.78	3.13	5.82	4.99	2.47	2.36	2.48
1990/91 to 1999/00	6.19	7.40	3.28	5.46	3.82	2.99	5.97	2.26
1990/91 to 1995/96	5.56	6.63	3.16	7.49	4.25	2.65	4.93	2.13
1996/97 to 2001/02	5.53	6.85	1.75	2.72	3.47	1.28	4.55	0.34

Though agricultural growth rates during 1990s by and large present favourable situation there have been frequent protests by farmers groups and reports of distress from the countryside about adverse impact of WTO on agriculture. It is possible that decadal growth rates conceals the true picture of growth experienced in pre and post WTO period. This was investigated by estimating separate growth rates for the two sub periods viz. 1990-91 to 1995-96 and 1996-97 to 2001-02, former representing domestic reforms before WTO and latter representing liberalisation following WTO. Growth rates for these two sub periods reveal a totally different story than what is seen from the decadal data.

As it can be seen from Table 1, growth experience of Indian agriculture after mid 1990s was totally different than the experience before mid 1990s. GDP of agriculture sector showed annual growth rate of 3.16 percent during 1990-91 to 1995-96, after which it declined to 1.75 percent. Growth rate of fishery between the pre and post WTO periods declined from 7.49 percent to 2.72 percent. Growth rate in output of livestock sector decelerated from 4.25 percent to 3.47 percent. Likewise, growth rate in output of crop sector after 1996-97 plummeted to less than half of what it was during 1990-91 to 1995-96. As a result, crop sector, which forms largest segment of agriculture, showed poorest growth during post WTO period in the history of post Independence India. Further, within crop sector, output of fruits and vegetables, which showed spectacular growth during 1990s, also followed deceleration in the recent years. Post WTO period turns out to be highly adverse to crop sector excluding fruits and vegetable as their output did not increase even at 0.5 percent per annum. These results indicate that initial years of reforms were somewhat favourable for raising growth of agriculture sector but after 1995-96 the sector showed very poor growth rate.

In order to see precisely in which year deceleration in agricultural growth started, the growth rates were estimated between fixed base 1990-91 and extending the terminal year from 1995-96 onwards. These results are presented in Table 2 which show that growth rate of agriculture sector reached peak by 1996-97 and slowed down after that. There is a continuous deceleration in the growth rate of livestock output after 1995-96. Slowdown in growth rate in horticultural crops started after 1998-99.

Table 2: Identification of the year showing deceleration in growth rates in GDP of economy and agriculture sub sectors at 1993-94 prices

	GDP				Value of output			
Period	Total	Non agriculture	Agri-Culture	Fishing	Live-stock	Crop sector	Fruit/ veg	Crops other than fruit/veg
1990/91 to 1995/96	5.56	6.63	3.16	7.49	**4.25**	2.65	4.93	2.13
1990/91 to 1996/97	6.01	7.04	**3.69**	**7.41**	4.12	**3.22**	5.92	**2.59**
1990/91 to 1997/98	6.09	7.26	3.35	6.90	3.95	2.92	5.91	2.21
1990/91 to 1998/99	6.16	7.33	3.43	5.90	3.89	3.10	**6.14**	2.36
1990/91 to 1999/00	**6.19**	**7.40**	3.28	5.46	3.82	2.99	5.97	2.26
1990/91 to 2000/01	6.12	7.38	3.01	5.07	3.76	2.66	5.88	1.84
1990/91 to 2001/02	6.06	7.29	2.95	4.96	3.73	2.58	5.78	1.76

The slowdown in agriculture growth rate after mid 1990s seems to have resulted from couple of factors. One, there is deterioration in terms of trade for agriculture towards late 1990s and beyond, mainly due to impact of depressed international prices of most of agricultural commodities on domestic prices (see Table 3). Two, output price intervention remained confined to already developed regions where crop yields have approached plateau and prices have little scope to improve supply response. Agriculturally underdeveloped regions which have potential for raising productivity and production did not have favourable output price environment. Three, despite lot of concern public investments in agriculture did not increase to keep pace with the needs and output growth (see Table 3). Four, adoption of new and improved technology remained slow. Five, large scale imports of some commodities in post WTO period caused adverse affect on their output. These are the probable causes. There is a need for quantitative study to establish exact role of these and other factors in influencing India's agriculture growth.

Table 3: Public sector investments in agriculture and index of terms of trade between agriculture and non agriculture sectors

Year	Public sector Gross Fixed Capital Formation	Public sector GFCF as % of GDP agriculture	Index of terms of trade Base triennium ending 1990-91=100
1970-71	3216	2.34	--
1980-81	7358	4.62	--
1990-91	4871	2.18	101.9
1991-92	4400	2.00	105.6
1992-93	4549	1.96	103.9
1993-94	4996	2.06	103.9
1994-95	5406	2.13	106.6
1995-96	5318	2.11	105.3
1996-97	4942	1.79	103.1
1997-98	4467	1.66	105.6
1998-99	4459	1.55	105.2
1999-00	4764	1.67	102.7
2000-01	4468	1.48	102.8
2001-02	--	--	102.3

IV
SOURCES AND GROWTH PROSPECTS AT STATE LEVEL

Estimation of growth in output in this chapter refers to crop sector only and excludes livestock sector. The reason for this exclusion is that livestock sector still continues to grow at close to 4 percent annual rate and the real problem of slowdown of agriculture sector resulted from slowdown in output of crop sector which accounts for three-fourth of total output of crops and livestock.

Estimation of growth prospects involves several steps as discussed in section I. The exercise involved estimation of output elasticity with respect to fertilizer and irrigation, scope of irrigation expansion and increase in fertilizer use, scope of diversification through high value crops, improvement in TFP, and then estimation of prospects of output growth through expansion of irrigation, increase in application of fertiliser, diversification and growth in TFP.

After mid 1960s expansion of irrigation and increased use of fertilizer have played primary role in exploiting production potential of any crop production technology that became available and in raising output. It is therefore instructive to look at change in output associated with changes in these two important inputs in different periods. The information for 1980s, 1990s and for recent five years for which data was available is presented in Table 4.

Table 4: Statewise growth rate in irrigation, fertilizer use and output since 1980-81

	Output			Fertilizers			GIA		
State	1980-81 to 1989-90	1990-91 to 1999-00	1998-99 to 2002-03	1980-81 to 1989-90	1990-91 to 1999-00	1998-99 to 2002-03	1980-81 to 1989-90	1990-91 to 1999-00	1998-99 to 2002-03
Andhra Pradesh	2.26	1.41	-2.65	9.63	3.15	-4.35	1.45	1.22	-6.06
Assam	1.85	2.19	3.02	10.89	13.88	22.44	NA	NA	NA
Bihar	2.13	4.73	-0.68	14.98	5.11	-1.58	2.14	1.92	0.23
Gujarat	-3.1	4.19	-5.9	5.79	4.61	-5.52	0.47	3.25	-1.15
Haryana	3.54	2.63	0.69	9.65	4.83	2.86	2.55	2.04	0.9
Himachal Pradesh	1.52	2.41	0.74	8.51	1.75	1.29	1.31	0.75	-0.11
Karnataka	3	2.86	-0.22	9.43	4.61	-1.05	5.03	1.54	-0.44
Kerala	2.21	2.61	2.24	10.26	-1.34	0.62	0.6	2.12	1.41
Madhya Pradesh	2.84	3.62	-6.71	15.51	3.39	-8.35	5.19	2.42	-4.2
Maharashtra	1.79	3.82	-0.24	9.55	4.59	-1.47	1.57	2.1	0.29
Orissa	2.89	-0.82	-4.08	10.2	6.98	-0.96	4.53	-1.49	-3.67
Punjab	4.59	1.1	1.4	4.59	1.74	0.26	1.95	0.73	0.73
Rajasthan	2.8	3.58	-8.4	9.43	8.88	-5.76	1.72	4.35	-3.25
Tamil Nadu	3.83	3.67	-9.3	5.81	2.28	-5.9	-1.23	1.59	-6.79
Uttar Pradesh	3.14	2.68	0.62	5.91	4.39	2.79	2.67	2.22	1.15
West Bengal	5.3	4.46	3.52	12.13	5.19	3.45	1.64	3.43	9.48

As can be seen from the Table 4 about half of the states show decline in area under irrigation and fertilizer use and 9 out of 16 states show negative growth in crop output in the recent period. This shows importance of fertilizer and irrigation in raising agricultural output. However exact response of output to these two modern inputs can be seen from elasticities of crop output with respect to changes in fertilizer and irrigation presented in following section.

Output Response to Fertilizer and Irrigation

A set of production function was estimated for all the major states using crop output at 1993-94 prices as dependent variable and level of fertilizer, irrigation and some other variables considered as explanatory variables. These estimation were based on time series data for the period 1980-81 to 2000-01. For each state very large number of regression equations were estimated to arrive at credible estimates of output elasticity. There were serious problem of multi-collinearity among dependent variables because of which different specifications of variables were tried. Final estimates of output response to fertilizer and irrigation in terms of elasticity are presented in Table 5.

In the case of Andhra Pradesh one percent change in fertilizer resulted in 0.36 percent change in crop output. The impact of irrigation was almost double the impact of fertilizer. In the case of Assam, data on area under irrigation was missing for most of the years. Because of this area under irrigation could not be included in the regression equation. Ultimately, average output response to irrigation in neighboring states of Orissa and West Bengal was used as a proxy of irrigation impact in Assam. Output response to fertilizer reveals that ten percent increase in use of inorganic fertilizer results in about two percent growth in crop output.

Table 5: Elasticity of crop output with respect to fertilizer and irrigation

State	Fertiliser	Irrigation
Andhra Pradesh	0.363	0.714
Assam	0.192	0.472#
Bihar	0.167	0.690
Gujarat	0.389	0.480
Haryana	0.283	0.660
Himachal Pradesh	0.398	0.965
Jammu and Kashmir*	0.398	0.965
Karnataka	0.251	0.942
Kerala	0.316	0.777
Madhya Pradesh	0.183	0.418
Maharashtra	0.294	0.585
Orissa	0.134	0.472
Punjab	0.231	1.382
Rajasthan	0.363	0.950
Tamil Nadu	0.700	1.004
Uttar Pradesh	0.330	0.826
West Bengal	0.450	0.303

#Refer to estimate for Orissa. * refers to estimates in respect of Himachal Pradesh

Crop output in Bihar was highly responsive to use of irrigation and fertilization. One percent increase in irrigation brought 1.2 percent increase in crop output. Similarly, one percent increase in fertilizer resulted in 0.53 percent increase in value of crop output. In Gujarat, unit increase in irrigation percent raised crop output by 0.5 percent. The impact of fertilizer was 0.4 percent. Crop output in Haryana increased by 0.28 and 0.66 percent in relation to one percent increase in fertilizer and irrigation.

In the case of Himachal Pradesh impact of irrigation was much stronger than that of fertilizer. For the state of Jammu and Kashmir adequate data was not available to estimate response of crop output to selected variables. Therefore elasticity variable pertaining to Himachal Pradesh, which is a neighboring state having similar topography were used. Crop output in Karnataka responded by 0.25 and 0.94 percent in response to one percent change in fertilizer and irrigation. Response in neighboring Kerala was slightly higher for fertilizer and slightly lower for irrigation.

Crop output in Madhya Pradesh shows moderate response to plant nutrient and application of water. A ten percent increase in fertilizer and irrigation in Madhya Pradesh raised output by 1.83 and 4.18 percent. The response in Maharashtra was 2.94 and 5.85 percent corresponding to ten percent change in plant nutrient and irrigation.

It was very difficulty to track impact of fertilizer on output in the case of Orissa, due to unmanageable problem of multicollinearity between fertilizer and irrigation. Ultimately, two separate production functions were estimated for this state including fertilizer and irrigation turn wise. These functions show output elasticity with respect to fertilizer as 0.134 and with respect to irrigation 0.472. Exactly similar problem was encountered in the case of Rajasthan where irrigation and fertilizer defined in various forms show strong and detrimental multicollinearity. Crop intensity was used as another variable in different specification to represent irrigation and or fertilizer. Output elasticity from these specifications turned out to be 0.363 for fertilizer and 0.95 for irrigation.

Crop output in Punjab show moderate response to fertilizer but very high response to irrigation. Highest response to fertilizer was obtained in the case of Tamil Nadu where one percent increase in fertilizer brought 0.7 percent increase in output. Elasticity of crop output with respect to irrigation was one. Crop output in Uttar Pradesh increased by 0.33 and 0.826 percent in response to one percent increase in fertilizer and irrigation. Compare to this response to fertilizer was much higher and response to irrigation was much lower in the case of West Bengal.

Above estimates of elasticity were used in estimating output growth that can be achieved to various sources and for making projection about quantity of fertilizer needed to achieve specified growth rate in crop output.

Scope of Irrigation Expansion and Resulting Output Growth

As it is well know and as it would be found from above discussion irrigation is a very important source of growth in crop output. The possibility of irrigation expansion in

various states in presented in Table 6. The table presents three kinds of growth rate in irrigation. The first set presents annual rate of growth in irrigation if irrigation potential of the state is fully utilized by the year 2020. The irrigation potential refers to sum of major, medium and minor sources of irrigation. In other words, it includes total potential of surface and groundwater irrigation. The second set of growth rates represents actual achievements in creating irrigation during 1990/91 to 2000/01. This reflects the actual effect of efforts made in the recent past in expanding irrigation. The third set of growth rate named as "feasible growth rate" indicate the likely growth or future expansion of irrigation. This is taken as the potential growth rate corresponding to full exploitation of irrigation by the year 2020 except for the state of Punjab, Haryana and Rajasthan and Kerala. The former states have over exploited their irrigation potential and actual area under irrigation in these states is more than the potential. These states are treated as having no scope for further expansion of irrigation. In Kerala, actual utilization of irrigation potential is less than one fourth of the potential. Because of this Kerala requires 8.01 percent annual increase in area under irrigation to fully exploit the potential. But this growth rate seems very unlikely given the past performance of the state. Therefore, to have a modest estimate it is assumed that Kerala would exploit its irrigation potential at the same rate as the average of the country – which again is 50% higher than Kerala's achievement in irrigation in the past.

Table 6: Scope for Irrigation expansion and its impact on output growth

State	Irrigated area: 000 ha		Ultimate Potential	Growth rate to exploit potential in 20 years	Growth in recent 10 years	Feasible growth rate	Output growth achievable with irrigation growth
	TE 1990-91	TE 2000-01					
Andhra Pradesh	5421	5918	9500	2.39	0.88	2.39	1.71
Assam			2670			3.00	1.42
Bihar	4186	4789	12400	4.87	1.35	4.87	3.36
Gujarat	2639	3698	4847	1.36	3.43	1.36	0.65
Haryana	4188	5130	4550	-0.60	2.05	0.00	0.00
Himachal Pradesh	171	181	335	3.13	0.57	3.13	3.02
Jammu and Kashmir	434	445	800	2.98	0.25	2.98	2.88
Karnataka	2594	3185	4600	1.86	2.07	1.86	1.75
Kerala	395	450	2100	8.01	1.31	1.98	1.54
Madhya Pradesh	3985	5227	11200	3.88	2.75	3.88	1.62
Maharashtra	3203	3781	7300	3.34	1.67	3.34	1.95
Orissa	2865	2332	6100	4.93	-2.04	4.93	2.33
Punjab	6937	7516	6550	-0.69	0.80	0.00	0.00
Rajasthan	4493	6626	5350	-1.06	3.96	0.00	0.00
Tamil Nadu	2937	3570	4200	0.82	1.97	0.82	0.82
Uttar Pradesh	14420	18000	25700	1.80	2.24	1.80	1.49
West Bengal	2491	3369	6110	4.01	3.07	4.01	1.22
All India	62060	75810	115615	2.13	2.02	1.95	1.43

Among all states Orissa is the only state which shows decline in area under irrigation during last 10 years. The rate of decline is more than two percent per annum. This has happened despite the fact that Orissa has not yet exploited even 40 percent of its irrigation potential. It is feasible to expand area under irrigation in Orissa by close to 5

percent for almost two decades before reaching the level of potential. Bihar also has similar potential. Area under irrigation can be expanded by more than 3 percent per annum in the states of Himachal Pradesh, Madhya Pradesh, Maharashtra and West Bengal. The scope for irrigation expansion in Uttar Pradesh and Karnataka is 1.67 and 1.80 percent per annum respectively.

This expansion in irrigation translates to 1.43% growth in crop output at national level. Because it is not feasible to expand irrigation in Punjab, Haryana and Rajasthan, therefore, no contribution of irrigation towards output growth is visualized in these states. Irrigation has highest potential for output growth in the state of Bihar. The state can achieve 3.36% annual growth in output through irrigation alone till year 2020. Himachal Pradesh also shows potential of raising output by 3% through exploitation of irrigation. Jammu and Kashmir and Orissa shows high potential for output growth through irrigation expansion. The scope is 1.71% in Andhra Pradesh 1.49% in U.P and 1.22% in West Bengal, Gujarat and Tamil Nadu indicate scope to raise output by 0.65 and 0.82% per annum through irrigation.

Agriculture Growth through Crop Diversification

With serious constrains on area expansion and declining scope of other sources of growth of agriculture output, lot of emphasis is being placed on crop diversification as a source of output growth. In our exercise we have prepared estimates of output growth that can be achieved with one percent shift in area from food grain to non-food grain crops. This is done based on productivity of food grain and non-food grain and projected change in share of food grain and non-food grain in total cropped area. The results are presented in Table 7. The Table shows that at All India Level per hectare productivity of foodgrain at 1993-94 price was Rs 7744 where as per hectare productivity of non foodgrain crops was Rs. 21722. There is lot of variation in productivity of food grain and non food grain across states. Per hectare output of foodgrain was less than Rs. 5000 in Rajasthan and Maharashtra. In contrast to this foodgrain productivity was more than Rs. 10000 in Andhra Pradesh, Tamil Nadu, West Bengal, Kerala, Haryana and Punjab. Similar variations exists in productivity of non food grain across States. Rajasthan is the only State where per hectare productivity of non-foodgrain was below Rs. 10000. Highest productivity of non food grain was observed in Himachal Pradesh where output of non-foodgrain was valued at Rs. 79378 per hectare. Punjab, which ranked at the top in terms of productivity of foodgrain, did not have high productivity of non-food-grain. Productiivity of non-foodgrain in the case of Punjab was less than national average. In other states the difference between productivity of foodgrain and non-foodgrain is quite high.

The current status of diversification can be seen from share of area under foodgrain and non-foodgrain in total cropped area. Share of foodgrain in total area was more than 70 percent in Bihar, West Bengal and Northern States except Rajasthan. Least Diversified state is Bihar where close to 90 percent area is under food grain. This is followed by Himachal Pradesh where about 88 percent area is allocated to foodgrain. Kerala, which is known for production of plantation crops, allocated less than 13 percent area to foodgrain. Crop Pattern shows much higher diversification towards non-

foodgrain crops in all Southern States. These states alongwith Maharashtra and Rajasthan allocated more than 40 per cent area to non-foodgrain crops.

Table 7: Potential of diversification towards non foodgrains and its impact on output growth

State	Productivity Rs/ha			Area share % of Non Foodgrain				Output increase due to one % area shift	
	FG	Non FG	Average	TE 1982	TE 1991	TE 2001	2011	Rs./ha	Percent
Andhra Pradesh	11119	17331	13937	29.8	39.8	45.4	50.9	62	0.45
Assam	7231	30271	14346	27.3	29.2	30.9	32.6	230	1.61
Bihar	7782	32954	10426	10.4	9.8	10.5	11.2	252	2.41
Gujarat	5993	13630	11115	57.2	55.7	67.1	67.1	76	0.69
Haryana	12142	21952	14982	27.0	30.8	29.0	34.0	98	0.65
Himachal Pradesh	6390	79378	15416	9.5	10.9	12.4	13.8	730	4.73
Jammu & Kashmir	7844	71602	20044	14.5	16.3	19.1	22.0	638	3.18
Karnataka	5620	29437	14634	35.0	39.0	37.8	39.0	238	1.63
Kerala	12770	27664	25756	70.7	79.9	87.2	87.2	--	--
Madhya Pradesh	5414	12046	7535	17.6	23.5	32.0	40.5	66	0.88
Maharashtra	4376	20462	10806	30.9	33.5	40.2	46.8	161	1.49
Orissa	5377	16344	9233	22.6	26.3	35.1	44.0	110	1.19
Punjab	16008	21952	17463	28.0	25.3	24.5	29.5	59	0.34
Rajasthan	4562	9221	6438	29.8	34.0	40.4	46.8	47	0.72
Tamil Nadu	11968	35544	21901	34.8	38.4	42.1	45.9	236	1.08
Uttar Pradesh	8799	32954	13950	18.0	19.2	21.3	23.5	242	1.73
West Bengal	11150	37848	19124	19.8	24.3	29.9	35.5	267	1.40
All India	7744	21722	12656	27.2	30.4	35.1	39.9	140	1.10

Projections on growth in output due to diversification towards non food-grain crops were based on difference in productivity and prospects of area shift. The prospects of area shift were based largely on the experience between TE 1991-92 and TE 2001-02. These estimation shows that highest diversification took palace in the state of Gujarat, Orissa and Madhya Pradesh. Gujarat has already allocated more than two third area to non foodgrains. Similarly, in Kerala more than 87 percent area is under non foodgrain crops. Based on discussion with the state level experts our assumption is that Kerala would not be able to further shift area away from food grains at state level. It is projected that in next 10 years area under non-foodgrain crops would increase by about 9 percent in Orissa and Madhya Pradesh as has been the experience during 1990s. Our projections show that annual shift in area from foodgrain to non-foodgrain would be 0.66 percent in Maharashtra, 0.69 percent in Rajasthan, 0.56 percent in West Bengal and Andhra Pradesh. Based on the past experience diversification is expected to be very low in Bihar.

Three states, namely, Karnataka, Punjab and Haryana show increase in area under foodgrain during 1990s. As serious attempts are being made in the State of Punjab and Haryana for diversification of their agriculture, we are presuming that these efforts would meet some, albeit small, success. Based on the discussions with experts of these two states it was found that it is reasonable to expect 5 percent shift in area away from food grains in next 10 years. This estimate is close to All India Average of 0.47 percent.

Due to variation in productivity per unit of area it is estimated that shift of one percent are from food grain to non-food grain would increase crop output by 1.10 percent at All India Level. The scope to raise output through diversification depend upon two factors. One difference in productivity and two base level area share. In Himachal Pradesh and Jammu & Kashmir scope to raise output through diversification is highest as one percent shift in area entails more than 3 percent growth rate in crop output at state level. Shift in one percent area from foodgrain to non foodgrain offers scope to raise crop output by 1.73 percent in Uttar Pradesh 1.6 percent in Karnataka and Assam, 2.4 percent in Bihar 1.5 percent in Maharashtra, 1.4 Percent in West Bengal, 1.2 percent in Orissa and 1.1 percent in Tamil Nadu.

Scope to Raise Output through TFP Growth

Up to date information on state-wise estimates of TFP of crop sector is not available for all the states. However, some scattered evidence for different states and for different periods were available. These were collated and pieced together to arrive at some credible estimates of TFP growth. One source is study by Kumar et al (2003) which provides estimates of TFP growth for the period 1981-96 for the states in Indo-Gangetic region. Another study by Desai (1997) provides estimates for TFP for different periods upto 1989-90 at All India level. These two studies also provide information about share of TFP in output growth of crop sector. These shares were used to estimate out put growth through improvement in TFP for the period 1991-92 to 20002-03. For some of the states for which TFP estimates were not available either a proxy was used or estimate of TFP in the states having similar resources endowment and agro climatic features was used. These estimates are shown in Table 8.

Table 8: Prospects of crop output growth through improvement in TFP

State	Output growth rates 1991/92-2002/03	Share of TFP %	Source	Output growth From TFP
Andhra Pradesh	1.36	29.62	Desai All India	0.40
Assam	2.57	34.22	Same as WB	0.88
Bihar	3.98	56.45	Kumar	2.24
Gujarat	1.26	37.17	Arid	0.47
Haryana	2.21	29.56	Kumar	0.65
Himachal Pradesh	2.98	36.21	Kumar	1.08
Jammu and Kashmir	1.16	36.21	Kumar	0.42
Karnataka	2.91	29.62	Desai All India	0.86
Kerala	2.03	29.62	Desai All India	0.60
Madhya Pradesh	0.89	29.62	Desai All India	0.26
Maharashtra	2.98	29.62	Desai All India	0.88
Orissa	0.46#	29.62	Desai All India	0.14
Punjab	1.23	29.56	Kumar	0.36
Rajasthan	0.68	37.17	Kumar	0.25
Tamil Nadu	1.18	29.62	Desai All India	0.35
Uttar Pradesh	2.32	25.81	Kumar	0.60
West Bengal	3.39	34.22	Kumar	1.16
All India	2.08	29.62	Desai All India	0.62

Growth rate during 1980-81 to 2002-03

Contribution of TFP to output growth was found to be as high as 56% in Bihar and as low as 26% in Uttar Pradesh. In agriculturally advanced states of Punjab and Haryana TFP contributed around 35% of out put growth.

Based on share of TFP in output growth and rate of growth of crop output during 1991/92 to 2002/03 it is estimated that improvement in TFP would make highest contribution to output growth in the state of Bihar. Here TFP would help in getting annual growth rate of 2.24% in crop output. Contribution of TFP of output growth is expected to be more than 1% in the states of Himachal Pradesh and West Bengal. In the case of Orissa output growth during 1991-92 to 2002-03 was negative. In order to compute TFP contribution historic growth of agriculture in Orissa was used which reveals 0.14% annual growth in crop output through improvement in TFP.

Scope to Raise Output through Growth in Fertiliser

Like irrigation, fertiliser has played an important role to tap potential of improved technology and to raise crop output. As can be seen from Table 9 fertilizer consumption witnessed sharp increase during the decade of 1980s. Consumption of fertilizer in the country increased from 32 kg / ha of net sown area in 1980-81 to 67 kg during 1990-91. Average annual growth in fertilizer use in this decade was 8.47 percent. This has been a major factor for reasonably high growth in agricultural production during the 1980s which exceeded average annual growth rate of 5 percent.

Table 9 : Growth in fertilizer use and crop output during 1980-81 to 2003-04

Period	Average annual rate of growth in		Average level of fertilizer use NPK/Ha of GCA
	Index of agricultural production	Fertilizer use	
1980-81 to 1990-91	5.07	8.47	32-67
1990-91 to 1999-00	2.26	4.67	67-95
1995-96 to 2003-04	1.40	2.60	75-90
2000-01 to 2003-04	1.21	-1.63	

Note : Growth rates are average of annual rate of increase in the given period

Fertilizer growth during 1990s turned out to be 4.40 percent as against 8.08 percent during 1980s for the whole country. One of the reasons for high growth in fertilizer was low base as fertilizer use in early 1980s was only 32 Kg/ha. Thus, though growth rate in fertilizer use during 1990 was relatively lower but still at 4.40 percent it was reasonable. This growth helped India to raise per hectare use of fertilizer to 95 Kg during 1999-00. Average fertilizer use in the recent three years covering 2001-02, 2002-03 and 2003-04 turned out to be 88 kg which is 7 percent lower than the record level reached in 1999-00.

Among different states variation in use of fertilizer is very wide – the ratio of lowest to highest state is 1 : 5.38. This indicates immense potential to promote fertilizer use in various states. Moreover, within the states there are wide inter-district variations in fertilizer use which further underscores the scope for increasing fertilizer use. Even in agriculturally most developed state of Punjab district wise use of fertilizer shows a large range. This indicates that both categories of states, using low fertilizer and those using

high level of fertilizer, there is a scope to raise fertilizer use and through that agricultural output.

As pointed out earlier, stagnation in irrigation and fertilizer use are the major factors for sharp deceleration in agricultural output in the recent years. Our exercise reveals that if fertilizer use is increased at about the same rate as witnessed during the decade of 1990s it would help India to annually increase its agricultural output by 1.32 percent. This growth rate in fertilizer is not ambitions or difficult to achieve as it involves raising fertilizer use in the country from 88 kg, as of now (TE 2003-04), to 147 Kg by the year 2014-15.

Application of fertilizer in most of the states in the recent years remained either stagnant or declined. This happened despite the fact that level of fertilizer in most of the states is low. The level of fertilizer use and its growth in different time periods is presented in Table 10.

At state level feasible growth rates in fertilizer in future may be more or less the same as were achieved during 1990s, depending upon scope to expand irrigation and existing level of fertilizer use. Accordingly, growth rates in fertilizer considered feasible for various states are presented in Table 10. It seems likely that Andhra Pradesh, Bihar, Gujarat, Himachal Pradesh, Jammu and Kashmir, Karnataka, Maharashtra, Orissa, Punjab, Tamil Nadu, U.P and West Bengal are in a position to increase fertilizer use by same rate as witnessed during 1990s. Rajasthan and Haryana seem to be in a situation to attain half the growth rate seen during 1990s as opportunities for expanding irrigation, which is an important factor for promoting fertilizer use, in these two states are constrained by the potential. Assam is also presumed to achieve half the growth rate of 1990s which was on a very high side. Fertilizer consumption in Kerala declined during 1990s. as there is considerable scope to increase are under irrigation in Kerala, the state has potential to increase fertilizer at the same rate as its neighboring state Karnataka. Despite lowest level of fertilizer use Madhya Pradesh recorded below average growth in fertilizer use during 1990s. It is presumed the MP would be able to increase fertilizer use at least by national average growth of 1990s.

The above mentioned increase in use of fertilizer would enable most of the states to achieve annual growth rate in output in the range of 1-2 percent. Feasible growth rate in output through increase in fertilizer would be minimum in Punjab - 0.40 percent. Haryana, Himachal Pradesh and Bihar are also projected to attain less than 1 percent annual growth in output through fertilizer. West Bengal and Jammu and Kashmir have potential to realize more than 2 percent annual growth in output by increasing application of plant nutrients.

Table 10: Fertiliser use and Scope to increase output through increase in fertiliser

State	Growth rate 1980/81 to 89/90	Growth rate 1990/91 to 99/00	Feasible growth rate	Fertiliser use Kg/ha TE 2003-04	Fertiliser use Kg/ha 2014-15	Output growth from increase in fertiliser
Andhra Pradesh	9.63	3.15	3.15	144	210	1.14
Assam	10.89	13.88	6.94	39	87	1.33
Bihar	14.98	5.11	5.11	82	149	0.85
Gujarat	5.79	4.61	4.61	77	132	1.79
Haryana	9.65	4.83	2.42	154	205	0.68
Himachal Pradesh	8.51	1.75	1.75	40	50	0.70
Jammu & Kashmir	9.97	5.11	5.11	61	111	2.03
Karnataka	9.43	4.61	4.61	101	173	1.16
Kerala	10.26	-1.34	4.61	62	107	1.46
Madhya Pradesh	15.51	3.39	4.40	32	54	0.81
Maharashtra	9.55	4.59	4.59	75	129	1.35
Orissa	10.20	6.98	6.89	38	86	0.92
Punjab	4.59	1.74	1.74	172	212	0.40
Rajasthan	9.43	8.88	4.44	33	56	1.61
Tamil Nadu	5.81	2.28	2.28	136	178	1.60
Uttar Pradesh	5.91	4.39	4.39	126	211	1.45
West Bengal	12.13	5.19	5.19	123	225	2.34
All India	8.08	4.40	4.35	88	147	1.32

Output Growth from All Sources

Expansion of area under irrigation, improvement in total factor productivity, resource shift towards high value enterprises and increase in application of fertilizer are the four sources of growth in agriculture. Crop intensity is another source for output growth but in our exercise its impact on output is captured by impact of irrigation on output. Scope to raise agricultural output through various sources in different states is summarized in Table 11.

Feasible growth rate in Punjab through all the four sources turns out to be lowest and less than 1 percent. Bihar has the scope to raise crop output annually by 6.64 percent in medium term which is highest among all the states. Growth prospects seem to be low in Haryana and Rajasthan which are projected to achieve 1.66 and 2.33 percent growth in crop output. Maharashtra, Himachal Pradesh and West Bengal possess potential for more than 5 percent growth rate. Growth prospects are also high for Orissa. Output growth rate in the remaining states is projected to be between 3-4 percent.

As it is obvious above growth rates are to be achieved by expanding irrigation, promoting fertilizer, crop diversification and growth in TFP. Actual growth rates required in fertilizer, irrigation, area under non foodgrain crops and TFP to achieve 4 percent growth rate in output are summarized in Table 12.

Table 11 : Output growth towards 2011 through various sources

State	Diversification	Irrigation	TFP	Fertiliser	Total
Andhra Pradesh	0.25	1.71	0.40	1.14	3.50
Assam	0.27	1.42	0.88	1.33	3.89
Bihar	0.18	3.36	2.24	0.85	6.64
Gujarat	0.78	0.65	0.47	1.79	3.69
Haryana	0.33	0.00	0.65	0.68	1.66
Himachal Pradesh	0.69	3.02	1.08	0.70	5.49
Jammu & Kashmir	0.90	2.88	0.42	2.03	6.23
Karnataka	0.19	1.75	0.86	1.16	3.96
Kerala	0.00	1.54	0.60	1.46	3.60
Madhya Pradesh	0.75	1.62	0.26	0.81	3.44
Maharashtra	0.99	1.95	0.88	1.35	5.18
Orissa	1.05	2.33	0.14	0.92	4.44
Punjab	0.17	0.00	0.36	0.40	0.94
Rajasthan	0.46	0.00	0.25	1.61	2.33
Tamil Nadu	0.40	0.82	0.35	1.60	3.17
Uttar Pradesh	0.37	1.49	0.60	1.45	3.90
West Bengal	0.78	1.22	1.16	2.34	5.49
All India	0.49	1.43	0.72	1.32	3.96

Table 12: Statewise growth in various factors needed to achieve 4 % output growth at national level

State	Fertiliser	Irrrigation	Area shift to non foodgrain	TFP
Andhra Pradesh	3.15	2.39	0.555	0.40
Assam	6.94	3.00	0.166	0.88
Bihar	5.11	4.87	0.074	2.24
Gujarat	4.61	1.36	1.136	0.47
Haryana	2.42	0.00	0.500	0.65
Himachal Pradesh	1.75	3.13	0.146	1.08
Jammu & Kashmir	5.11	2.98	0.283	0.42
Karnataka	4.61	1.86	0.116	0.86
Kerala	4.61	1.98	0.000	0.60
Madhya Pradesh	4.40	3.88	0.854	0.26
Maharashtra	4.59	3.34	0.664	0.88
Orissa	6.89	4.93	0.884	0.14
Punjab	1.74	0.00	0.500	0.36
Rajasthan	4.44	0.00	0.640	0.25
Tamil Nadu	2.28	0.82	0.374	0.35
Uttar Pradesh	4.39	1.80	0.213	0.60
West Bengal	5.19	4.01	0.559	1.16
All India	4.35	1.95	0.497	0.72

India need to increase fertilizer consumption in agriculture by 4.35 percent and area under irrigation is required to be increased annually by 1.95 percent in order to contribute towards goal of achieving 4% output growth. Further, there is a need to shift about 0.5 percent area from foodgrains to non-foodgrains every year. Achieving these is

quite feasible in the light of achievements in these factors in the past and in the light of available potential. Growth in TFP in India is projected to be 0.72 % per year at all India level. Here it needs to be mentioned that TFP consists of contribution of several factors. The most important among these is technology and its dissemination. Improvement in infrastructure and farmer's knowledge and skill applied to farming are other contributions to TFP.

References

Bhalla G.S. (2002). *Globalisation and Agricultural Liberalisation in India*, A Study Sponsored by Ministry of Agriculture, Government of India, CSRD, Jawaharlal Nehru University, New Delhi.

Bhanumurthy N.R. and Sapna Sinha (2004). Industrial Recovery: Can It Be Sustained, *Economic and Political Weekly,* Vol. 39, No. 5, January 31 – February6.

Chand, Ramesh (2001). Emerging Trends and Issues in Public and Private Investments in Indian Agriculture: A Statewise Analysis, *Indian Journal of Agricultural Economics*, April – June, Vol.56, No. 2: 161-184.

Desai bhupat and N V Namvoodiri (1998). Determinants of Total Factor Prioductivity in Indian Agriculture, Economic and Political Weekly, Vol. 32 952): A 165-A170.

Gulati, Ashok and Bathla Seema (2001). Capital Formation in Indian Agriculture, *Economic and Political Weekly,* Vol. 36, No. 20, May 19-25.

Kumar P. (2002). Agricultural Performance and Productivity, in Acharya S.S. and Chaudhri D.P. ed. *Indian Agricultural Policy at the Crossroads*, Rawat Publications, Jaipur, India.

Kumar P. et.al. (2002). Economic Analysis of Total Factor Productivity of Crop Sector in the Indo Gangetic Plain of India by District and Region, AERR 2002(2), Division of Agricultural Economics, IARI, New Delhi.

Mujumdar N. A. (2002). Rural Development: New Perceptions, *Economic and Political Weekly*, Vol.37 No. 39, September 28.

Shenngen Fan, Peter Hazell and T. Haque (1999) "Impact of Public Investments in Agricultural Research and Infrastructure on Growth and Poverty Reduction in Rural India, Discussion Paper IFPRI, Washington D.C.



INDIAN FARMERS AT THE CROSSROADS
SOME EVIDENCE FROM STATES

By

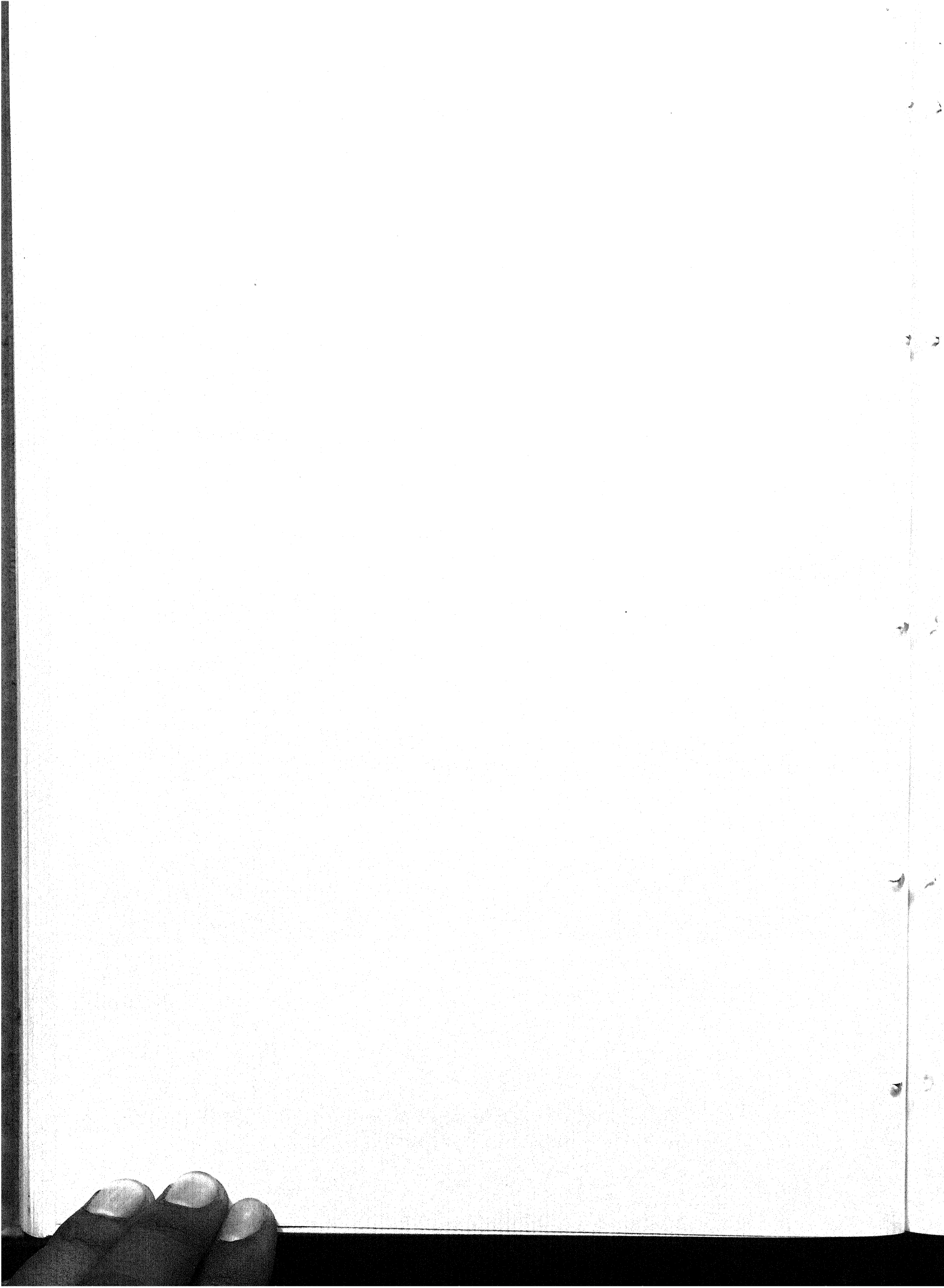
SURJIT SINGH

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Indian Farmers at the Crossroads
Some Evidence from States

Working Draft

Surjit Singh

Indian agriculture has made stupendous strides since the mid-1960s. India has emerged out of chronic hunger and abject dependence on the import of food grains and has achieved not only self-sufficiency in the availability of food grains but has become a net exporter of food grains. Millions of India farmers, including marginal and small farmers, have helped achieve this. With the advent of globalisation even the expectations of farmers have been aroused (Rao, 2004). However, the trends over the past few years are not effectively been pro-farmer. Indian farmer is in distress (Vyas, 2004) and finds himself at the crossroads. Some say, he would be a gainer in the changing environment while others are more pessimistic. This paper tries to look at some of the issues that lead us the think that Indian farmer especially the small and marginal farmer is at the crossroads today. The paper mainly relies on NSSO report on Indebtedness of Farmer Households of May 2005.

Indian Farmers and Agriculture

The Green Revolution along with the nationalisation of major commercial banks did help take India towards food sufficiency. For the Indian economy this was certainly a significant achievement. However, the macro economic statistics of self-sufficiency did not get translated into food security for everybody, especially the poorer sections of the population involved in agricultural production. Skewed distributions of land holdings, inadequate access to credit, and imperfect markets for agricultural produce has resulted in avoidable poverty and insecurity. While this inequitable distribution of and access to, major resources has been a problem of Indian agriculture for a long time in history, the past decade and a half has compounded many problems of the sector (Singh and Sagar 2004). Productivity gains of the Green Revolution have arguably tapered off in the major food grains such as rice and wheat.

The liberalisation of the economy and the proposed disciplines imposed by WTO has added a large dose of uncertainty in Indian agriculture over and above the vagaries of the monsoon (Singh 2005d; 2005e). In such a situation the small and marginal farmers are adversely affected in two distinct but interrelated ways. The first is the fact that the gains of the technology they use have petered off making it difficult for them to continue to grow with the same cropping patterns, input mix, and local market imperfections for

their final produce. The result is a gradual stagnation of farm income for this section. There has also been a perceptible shift of the cropping pattern away from inferior cereals that they consume in favour of cereals that have higher value in urban areas or in export markets. The result of this trend has been to make their cost of living higher, and net cash incomes more uncertain. The access to formal credit markets such as commercial banks has certainly not increased. Rather, banks have found non-agricultural lending more attractive and easier to intermediate in (Singh 2005c). Banks have been too risk averse and somewhat unimaginative in ensuring a completely different approach to its credit delivery system in agriculture, especially ways and means of reaching the small and marginal farmers.

The policies too have been against the farming community (Singh and Sagar 2004). If a farmer defaults due to even vagaries of nature, he is not entitled to another loan till the first one is paid back. The tenant farmers were always denied bank loans. This has not been corrected by Kisan Credit Cards. The interest rates have been high (Singh 2005c). A retail loan borrower can borrow at 9 percent to purchase a car or a house, but farmers had throughout paid much higher interest rates. It is only during the 2006-2007 budget that the Union Finance Minister has reduced the interest rate to 7 percent up to a limit of Rs.3 lakh (a very high limit). An average loan requirement of Indian farmer for crop production is not more than Rs.10000 (Singh and Sagar 2004; Singh 2005c).

The credit requirement also goes up with these changes and so does the vulnerability. Changes in cropping pattern towards such crops influence change in input structure. The relative prices of inputs too have changed in the nineties. The subsidies have been reduced, though still significant. Inputs like fertilisers, insecticides, mechanical power and improved seeds are vital parts of input structure. They have replaced organic manure (though getting back into reckoning), animal power and farm-retained seeds. Farmers expend sizeable part of resources on purchased inputs. The value of inputs has almost doubled during 1993-94 and 1999-2000 (Singh 2005b). The farmers have to take recourse to credit to a much larger extent than in the past for purchase of inputs. The flow of SAO credit during the same period has improved from Rs.9752 crore to Rs.23694 crore, a 2.5 times increase (Vyas 2004) The crop loan from all financial institutional to agriculture covered 17.6 per cent of input cost in 1993-94 and about 23 per cent in 1999-2000. However, it has more or less been stagnant since 1996-97. This means that even today less than quarter of input cost is covered by formal sector credit. This situation forced farmers, especially at the lower end to go to moneylender to borrow at a very high rate of interest (36 percent) when the cost of production has gone up significantly (Singh 2005b). The result is that farmers have to depend on other sources of credit including own savings to meet more than three-fourth of the cost of material inputs (Singh 1999; Singh and Sagar 2004 for informal sector credit flow to agriculture). On the other hand, as a percentage of gross value of output, credit has stagnated around 5 per cent when inputs as a percentage of value of output have been around 25 per cent. There has been spate of

suicides in Major states like Andhra Pradesh, Punjab and Maharashtra where farmers have been trying costly new technologies and seeds. The mounting debt has forced farmers into this recourse (see Patnaik 2003; Sainath 2006a; 2006b; 2006c). The result is that an estimated 27 percent of farmers do not like farming because it is not profitable. If given the choice, 40 percent farmers would take up some other career (NSSO 2005b).

Other Hard facts on Indian Farmer

The Indian farmer has relatively the same level of literacy as the rural population. For every 1000 male farmers, 35.1 percent are not literate, 1.7 percent are literate without formal schooling, 10.1 percent are literate but below primary education, 15.7 percent have primary level education, 18.8 percent are middle pass, 10 percent are secondary pass, 4.8 percent are higher secondary pass, 0.4 percent have diploma/certificate course, 2.6 percent are graduates and only 0.7 percent have post graduate and above level education. **This shows that 47 percent male farmers are either illiterate of have below primary level education and 63 percent have education level of primary or below. Educated male individuals are hardly attracted towards farming.** In case of female farmers, for every 1000 female farmers, 69.2 percent are not literate, 0.9 percent are literate without formal schooling, 6.4 percent are literate but below primary education, 10.2 percent have primary level education, 8.5 percent are middle pass, 3.2 percent are secondary pass, 1.1 percent are higher secondary pass, 0.1 percent have diploma/certificate course, 0.3 percent are graduates and none have post graduate and above level education. **This shows that 77 percent female farmers are either illiterate of have below primary level education and 87 percent have education level of primary or below.**

Only 18 percent farmer households know what bio-fertilisers are and 29 percent understand what minimum support price meant. Today everyone is taking about WTO and its impact, but only 8 percent farmers had heard of the WTO. Risk management through crop insurance is also poor. Only 4 percent farmer households had ever insured their crops and 57 percent did not knew that crops could be insured (for a very detailed study on crop insurance, see Vyas and Singh 2005).

On credit linkage with formal institutions, 29 percent of farmer households had a member of a co-operative society and only 19 percent had availed themselves of services of a co-operative. Most of these households availed themselves of either credit facilities or services related to seeds or fertilisers.

On the use of fertilisers, 48 percent farmer households purchased their seeds and 47 percent used farm-saved seeds. During kharif, 76 percent farmers use fertilisers while a lower proportion, 54 percent, do so during rabi. 56 percent farmer households use organic manure during kharif and 38 percent during Rabi. There are 30 percent farmers who replace seed varieties every year, with another 32 percent replacing them every alternate year. It is surprising that 46 percent farmers only use improved seeds during kharif and

34 percent during the rabi season (NSSO 2005c). Thus, there are still untouched farmer community as regards the fertiliser use, be it organic or inorganic. Also, large section is untouched by improved seeds too.

It is also observed that 40 percent of farmer households access various sources of information for modern technology for farming. And the most popular sources of the 16 sources, is 'other progressive farmers'. This means demonstration has an important role and progressive farmers and those with better assets base are the first adopters and small-marginal farmers adopt technology with a lag. The other sources of information are input dealers (13.1 percent) and radio (13.0 percent). This shows that media and those individuals who are in constant touch with farmers do pass on information on new technologies. There are however, regional variations. For instance, 34 percent Andhra Pradesh farmers access information through 'other progressive farmers'. It is followed by Gujarat (30 percent) and West Bengal (25 percent). The need basis and seasonally contact determine the source (NSSO 2005b).

Flow of Credit

Each announcement of the government says that credit flow to agriculture should increase, as agriculture is important for growth. There is no doubt that in absolute terms the credit flow to agriculture sector is improving, but in percentage terms it is going down since the financial reforms have been initiated with exception of only a few states (see appendix 1 for details). For instance in Andhra Pradesh, the share of agriculture in total accounts was 52.37 percent and in credit 2.94 percent in 1991-92, but by 2003-04, the corresponding shares were 47.23 and 17.93 percent. In Bihar, the share of agriculture in total accounts was 42.41 percent and in credit only 25.24 percent in 1991-92, but by 2003-04, the corresponding shares were 30.16 and 15.34 percent. Take the case of Punjab, the share of agriculture in total accounts was 46.26 percent and in credit 24.59 percent in 1991-92, but by 2003-04, the corresponding shares were 40.14 and 19.86 percent. This means that share of agriculture in total accounts and in credit has gone down. There are few exception though.

Look at per account credit. In Andhra Pradesh, per account total credit outstanding was Rs.13656 compared to per account agriculture credit at Rs.6242 in 1991-92. In 2003-04, the corresponding amounts were Rs.77110 and Rs.29267. In Punjab, per account total credit outstanding was Rs.31170 compared to per account agriculture credit at Rs.16568 in 1991-92. In 2003-04, the corresponding amounts were Rs.182820 and Rs.90426. Similar scenario emerges for almost all states.

NPA and Agriculture

It often said that banks have high non-performing assets because of bad debts in agriculture. Tables 1 and 2 provide information on non-performing assets of public sector banks and private sector banks as on end March 2004. Public sector banks as on March end

2004 had NPA of Rs.50148.31 crore. Of this 47.54 percent is due to priority sector, 1.22 percent due to public sector and the remaining 51.24 percent due to non-priority sector. The contribution of agriculture sector to this NPA is 14.44 percent when small-scale industries contributed 17.62 percent and others 15.48 percent. Thus, even within the priority sector the share of agriculture sector is the lowest. In case of private sector banks, both old and new, the total NPA stood at Rs.10352.31 crore and priority sector contributed 23.97 percent and the non-priority sector another 75.30 percent. The contribution of agriculture sector is mere 4.43 percent while small-scale industries another 12.19 percent and others 7.35 percent. This shows that agriculture is not the main culprit for NPAs of public sector banks and it is hardly in case of private sector banks. Private sector banks have a lower priority sector lending to agriculture. This data also shows that non-priority sector is mainly responsible for NPA of private sector banks. Delving further into the tables show that NPA various widely across public sector banks and also private sector banks. The role of private sector banks is minimum in Indian agriculture.

Indebtedness of Farmers

Even in the British era various studies were conducted to ascertain the debt position of rural population and farmers (see Singh and Sagar 2004). In the post independence period every 10 years indebtedness surveys have been conducted along with numerous commissions and individual researches to analysed the debt burden on Indian rural population and farmers. However, a serous effort was made through Ministry of agriculture to look into the situation of Indian farmer. As a result NSSO conducted a special survey on Indian Farmers in 2003. This survey has thrown up significant results on debt of Indian farmer. The following discussion relates to this survey and analyses the data.

At all-India level, 48.6 percent farmer households are indebted. The rate of indebtedness of farmer households in different social groups is 36.3 percent in scheduled tribes, 50.2 percent in scheduled castes, 51.4 percent in other backward castes, and 49.4 percent in others. If we exclude scheduled tribe farmer households around half of the households in all other social groups are indebted.

Among 100 indebted farmer households, it is observed that 10 percent households are from scheduled tribes, 18 percent from scheduled caste, 43.9 percent from OBC and 28.1 percent from others group (table 3). Between the two states viz., Andhra Pradesh and Tamil Nadu vast majority of farming community is indebted. In Andhra Pradesh 10.8 percent indebted households belong to scheduled tribe, 17 percent to scheduled caste, 47 percent to OBC and 25 percent to others. The corresponding proportions in Tamil Nadu are 4, 22, 73 and 1 percent respectively. Table presents interesting picture. For instance, Jharkhand has 23.9 percent indebted farmer households from scheduled tribe group compared to only 2.9 percent in Bihar. But 59.8 percent indebted farmer households

belong to OBC group in Bihar and only 48 percent in Jharkhand. Punjab had 57.9 percent indebted households coming from others group and only 15.8 percent from OBC group. The demographic composition of rural farming community is reflected in these percentages. Thus given the local rural farming population composition, indebtedness proportions vary widely across states.

Indebtedness of Farmers by Source of Income

Table shows distribution of indebted farmer households by different sources of income. The main source of income of farmer households is categorised as cultivation[1], farming other than cultivation[2], other agricultural activities[3] and others[4]. We find that out of the total number of farmer households of 57.2 percent are cultivators and among these 48.4 percent are indebted, 3.0 percent farmer households had source of income 'farming other than cultivation', while 3.9 percent had 'other agricultural activities' and 35.9 percent had "others'. In each of these categories nearly 48-52 percent households are indebted. On an average, out of 100 indebted farmer households, 56.9 percent had source of income 'cultivation', 3.2 percent had 'farming other than cultivation', 4.1 percent had 'other agricultural activities' and 35.7 percent households had 'others' (table 4). Across states, out of 100 indebted farmer households with 'cultivation' as source of income varies from a low of 14.4 percent households in Kerala to a high of 78.4 percent in Meghalaya.

Percent of Households with 'Cultivation' as Source of Income

60 to 80 percent	Meghalaya, Mizoram, Arunachal Pradesh, Tripura, Nagaland, Uttranchal, Uttar Pradesh, Madhya Pradesh, Gujarat, Maharshtra, Assam, and Karanataka
50 to 60 percent	Haryana, Chattisgarh, Rajasthan, West Bengal, Andhra Pradesh, Bihar, Punjab, Orissa, Sikkim, Tamil Nadu and Manipur
40 to 50 percent	Jharkhand, UTs group and Himachal Pradesh
Below 40 percent	Jammu & Kashmir and Kerala,

On the other hand, out of 100 indebted farmer households, 'farming other than cultivation' as a source of income is the highest in case of Kerala (14.1 percent) with none in Arunachal Pradesh. In most states, this percentage is below 5 percent. Out of 100 indebted farmer

[1] Cultivation means activities related to production of crops by tillage and related ancillary activities.
[2] Includes animal husbandry, poultry, fishery, piggery, bee keeping, etc.
[3] Growing of trees, horticultural crops (orchards), and plantations (rubber, cashew, pepper, coffee, tea etc.) are considered under other agricultural activity.
[4] Others comprise wage/salaried employment, non-agricultural enterprises, pension, remittances, interest and dividends, and other source.

households, 'other agricultural activity' as a source of income is the highest in case of UTs (13.7 percent) and none in Assam, Jammu & Kashmir, Mizoram, Nagaland, Sikkim and Uttaranchal. In most other states, this percentage is below 5 percent. Besides, out of 100 indebted farmer households, 'others' as a source of income is the highest in case of Kerala (61.3 percent) with 13.7 percent in Meghalaya.

Percent of Households with 'Others' as Source of Income

50 and above	Kerala, Madhya Pradesh, Jammu & Kashmir and Himachal Pradesh
40 to 50 percent	Sikkim, Jharkhand, Bihar, Orissa, Punjab and Tamil Nadu
30 to 40 percent	Manipur, Assam, West Bengal, Andhra Pradesh, Himachal Pradesh, Haryana, Rajasthan, Chattisgarh, Uttarnachal, Gujarat, Karnataka, Rajasthan, and UTs group.
Below 30 percent	Arunachal Pradesh, Madhya Pradesh, Nagaland, Uttar Pradesh, Meghalaya and Mizoram.

This shows that indebted farmer households do have principal income from other than cultivation. Kerala is one state where cultivation does not seem to be a major source of income. This data reveals that there are diversified sources of income of indebted farmer households. Even in agriculturally developed states like Punjab, only 52.7 percent (out of 100 households) have cultivation as a principal source of income.

Indebtedness by Holdings

Table shows that for land possessed classes below 0.01 hectare, 0.01 to 0.40 hectare, 0.41 to 1.00 hectare, 1.01 to 2.00 hectare, 2.01 to 4.00 hectare, 4.01 to 10.00 hectare and more than 10.00 hectares, the corresponding proportions of total farmer households were 1.4, 32.8, 31.7, 18.0, 10.5, 4.8 and 0.9 percent respectively (table 5). The rates of indebtedness in these categories of farmers were 45.3, 44.4, 45.6, 51.0, 58.2, 65.1 and 66.4 percent. This means that in different land sized farmers, 44 to 66 percent farmer households were indebted. The average prevalence rate of indebtedness is 48.6 percent. On an average, out of 1000 indebted farmer households, the numbers in different size classes of land possessed are 13, 299, 298, 189, 125, 64 and 12 respectively. Thus, nearly 80 percent of indebted farmer households possessed land amounting to 2 hectares or less.

The average amount of outstanding loan per farmer households according to the land possessed varies from Rs.6121 (below 0.01 hectare) to 76232 (10 hectares or more). The average loan outstanding is Rs.12585. This means that as the holding size goes up the loan outstanding increases. The difference between the top and lowest category of land holding is Rs.70111.

At the state level, on an average, out of 1000 indebtedness farmer households, Tripura has all the farmer households with land size of below 2 hectare. The minimum percentage of indebted farmer households is in Madhya Pradesh (60.1 percent) with land size of below 2 hectares.

Proportion of Indebted Farmer Households with below 2 hectares Land

60 to 70 percent	Gujarat, Madhya Pradesh, Maharashtra, Punjab and Rajasthan
70 to 80 percent	Arunachal Pradesh, Andhra Pradesh, Chattisgarh, Haryana and Karnataka
80 to 90 percent	J&K, Mizoram, Tamil nadu, UP and UTs.
90 to 100 percent	Assam, Bihar, HP, Jharkhand, Kerala, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, Tripura, Uttarnchal and West Bengal,

This also reflects the land holding pattern of these states.

On the other hand, the percentage of indebted farmer households with land size of 10 plus hectares is maximum (4.5 percent) in Rajasthan followed by Madhya Pradesh, Maharashtra and Punjab. 13 states of the 28 states have no farmer household in this category with debt.

Thus, indebted households across states are mainly small and marginal farmers.

It is observed that the average outstanding loan per farmer household varies widely from state to state. The averages are quite high for the states like Punjab, Kerala, Haryana, Andhra Pradesh, Tamil Nadu, Rajasthan and Karnataka. The average amount of loan per farmer household in different social groups is Rs.5506 for scheduled tribe, Rs.7167 for scheduled caste, Rs.13489 for OBC and Rs.18110for others (table 7).

First let us consider scheduled tribe farmer households across states. We know that scheduled tribe population is concentrated in few states and in the rest, the proportion is small. The average amount of outstanding loan per farmers varies from a low of Rs.71 in Megahalaya to a high of Rs.118495 in Punjab.

Scheduled Tribe Farmer Households

Top Five states	Punjab, Haryana, Tamil nadu, Andhra Pradesh and Rajasthan (difference is Rs.106477)
Bottom Five States	J&K, Uttaranchal, (no farmer) Meghalaya , Arunchal Pradesh, Assam, Manipur and Nagaland (difference is Rs.1007)

In case of scheduled caste farmer households, all north- eastern states do not have scheduled caste farmers and so no debt is reported. Of the remaining states the highest debt per farmer household is in Rajasthan (Rs.16708) while it is the lowest in Sikkim (Rs.586).

Scheduled Caste Farmer Households

Top Five States	Rajasthan, Haryana, Kerala, Tamil nadu and Andhra Pradesh (difference is Rs.3988)
Bottom Five states	Arunachal Prdaesh, Meghalaya, Manipur, Mizoram and Nagaland (no farmer) Sikkim, J&K, Uttaranchal, Assam and Jharkhand (difference is Rs.2406)

The other backward class (OBC) is concentrated in few states, Hindi speaking areas. Table shows that the average debt per farmer household in this category of farmers across states is the highest in Madhya Pradesh (Rs.33116) and the lowest in Meghalaya (Rs.61). The difference is of Rs.33055.

OBC Farmer Households

Top Five states	Madhya Pradesh, Tamil nadu, Haryana, Andhra Prdaesh and Rajasthan (difference is Rs.11107)
Bottom Five States	Arunachal Pradesh and Mizoram (no farmer) Meghalaya, Nagaland, Assam, J&K and Sikkim (difference is Rs.1482)

The 'other' farmers group has an average debt of Rs.18118 at the all India level. Table shows that the average debt per farmer household in this category of farmers across states is the highest in Punjab (Rs.66147) and the lowest in Meghalaya (Rs.98). The difference is of Rs.66049.

Other Farmer Households

Top Five States	Punjab, Kerala, Andhra Pradesh, Haryana and Madhya Padesh (difference is Rs.40706)
Bottom Five States	Mizoram (no farmer) Meghalaya, Nagaland, Uttaranchal, Assam and Sikkim (difference is Rs.2094)

All Farmer Households

All farmer households have an average debt of Rs.12585 at the all India level. Table 7 shows that the average debt per farmer household in this category of farmers across

states is the highest in Punjab (Rs.41576) and the lowest in Meghalaya (Rs.72). The difference is of Rs.41504.

Thus we find that Punjab has the highest indebted farmer households and indebted farmers are very few in the north-eastern states and the average debt per farmer is also low there. It is also because penetration of banking sector is poor in that region. Punjab, Kerala, Andhra Pradesh, Haryana and Madhya Padesh are the major states with high per farmer debt. However there is significant difference between the top state and the bottom state. Also, a significant difference exist between the top state Punjab and the second state. Why these differences exist across states would be discussed in the ensuing sections.

Purpose of Loan

Various debt surveys have shown that farmers use the loan for both productive and unproductive purposes. When a farmer household is hard of cash, which it invariably is, there is always bound to be diversion of the loan from the purpose it is sought for. What are the reasons for indebtedness thrown up by the survey? Table 8 shows that there are two most important purposes of taking loan viz., capital expenditure in farm business and current expenditure in farm business.

At the all India level, out of every Rs.1000 loan taken, 58.4 percent had been borrowed for these two purposes taken together (table 9). In many states, it is found that 50 percent or more of the total amount of loan has been borrowed for one or the other of these two purposes. The next important purpose reported is marriages and ceremonies. In terms of percentages of loan amount taken, this is the most important purpose for farmers in Bihar followed by Rajasthan. In Himachal Pradesh out of every Rs.1000 borrowed, 29 percent has been for non-farm business while in Manipur 22 percent goes in for medical treatment and 20.3 percent for education in Arunachal Pradesh.

More than 30 percent Use for	
Capital Expenditure in Farm Business	Chattisgarh, Madhya Pradesh, Mizoram and Uttar Pradesh
Current Expenditure in Farm Business	Gujarat and Meghalaya
Other Expenses	Arunachal Pradesh, Assam, J&K, Madhya Pradesh, Manipur, Nagaland, Sikkim and UTs
20 to 30 percent Use for	
Non-farm Business	Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh andTamil Nadu

10 to 25 Percent in Use for Consumption Expenditure	Andhra Pradesh, Arunchal Pradesh, Assam, J&K, Karnataka, Madhya Pradesh, Megahalaya, Mizoram, Mainpur, Nagaland, Orissa, Rajasthan, Sikkim, Tamil Nadu and UTs
Marriages & Ceremonies	Assam, Chattisgarh, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasathan, UP, West Bengal and UTs
5 to 25 percent in Use for Education	Arunachal Pradesh, Manipur and Nagaland,
Medical Treatment	Arunachal Pradesh, Bihar, Manipur, UP and UTs

The above discourse shows that Chattisgarh, Madhya Pradesh, Mizoram and Uttar Pradesh in (may be) order to increase agricultural income, farmers borrow to invest more in capital formation in agriculture. Gujarat and Meghalaya are using the loan for crop production extensively. Arunachal Pradesh, Assam, J&K, Madhya Pradesh, Manipur, Nagaland, Sikkim and UTs are using loan for other expenses. This means that across states loan is being used for varied purposes, and priority is well set. For some education and medical treatment is important, for others capital formation in agriculture is vital. It appears that less agriculturally developed states borrow more for social functions.

Debt by Source of Loan

It is observed that two most important sources of loan are bank and agricultural /professional moneylenders across the states. Table 9 shows that for every Rs.1000 lent to farmers, then share of the share of the two mentioned sources is 35.6 and 25.7 percent. The next important source is co-operative society. It is found that farmers from Maharashtra and Gujarat borrowed the highest amount (48.5 and 41.8 percent respectively) from this source. Besides, Kerala, Haryana and Tamil Nadu use co-operatives as the main source of loans. At the other end, some of the north-eastern states like Meghalaya, Aruncahal Pradesh, Manipur etc. borrowed sufficient amount of loans from their friends and relatives.

Thus, banks, co-operative society moneylender in different forms constitutes main lenders. When small and marginal farmer households are the mainly indebted then the concern becomes crucial. In this whole process they may lose land, it is happening in most states.

Indebtedness by Purpose of Loan and Source

Why farmer households become indebted? The most important purpose of loan is current expenditure in farm business. At all India level, on an average 37 out of 100 indebted farmer households took loan for this purpose (table 10). Across the states, loans taken for current expenditure in farm business are most common (56 out of 100 indebted households (in Gujarat followed by Maharashtra (53 households), Karnataka (52 households) and Andhra Pradesh (51 households). The second most important purposes of loan are capital expenditure in farm business and consumption expenditure. In J&K, 85 out of 100 indebted households took laon for the purpose of consumption expenditure. This purpose predominates in Sikkim (74 out of 100 households), Mizoram (54 out of 100 households) and Nagaland (52 out of 100 households).

The most important source of loan is agricultural/ professional moneylender. At the all India level, on an average, 29 out of 100 indebted households borrowed from moneylenders (table 11). Across states, the incidence of borrowing from moneylender is the highest in Andhra Pradesh followed by Tamil Nadu. Bank and co-operative societies are the next important sources. Kerala and Uttaranchal have the highest incidence of bank loans- 42 and 40 per 100 indebted households respectively. Incidence of loans from co-operative societies is the highest in Maharashtra followed by Kerala. Farmer households of J&K and Sikkim depend mainly on loans from traders. The incidence is 88 out of 100 indebted households in J&K and 70 in Sikkim. Farmer households of Meghalaya mainly depend on relatives and friends for loans (91 out of 100 households).

Thus across states, moneylender in different garb has become important source of loan. It appears that time when loan is required determines the source across states.

Conclusions

It is imperative that farm credit programmes become more imaginative in their approach towards raising the efficiency and effectiveness of small farmers in agriculture. Under the changing economic environment improved competitiveness, high quality and high safety farm products and cooperative marketing schemes are essential so that the gains of modernisation are garnered by small producers and not cornered by large traders. In the process of modernising small-scale agriculture, there cannot be a blanket solution for all and sundry. How biological sciences and information technology can be leveraged in varying local conditions is of critical importance. Cooperative initiatives in credit supervision and marketing are other significant steps in the process. Finally, credit instruments should not merely focus on primary production but on augmentation of the entire value chain such as food processing, or value addition for commercial crops. There is obvious merit in designing sustainable micro finance institutions that are different from conventional modes of lending.

For the poor farmer, credit becomes the most important input (second only to land) in providing any hopes of stability and growth. From the point of view of the lending institutions there is considerable challenge in designing packages that reduce total risk, provide some minimum returns and ensures the optimal use of information, technology and labour. In other words, banks must learn to think of credit as a comprehensive package that ensures survival and yet provides incentives for growth. Credit institutions must learn to blend better with local institutions that promote cooperative solutions. The global economy must be made to prosper for the people at the bottom of the pyramid. The gold that is there must be augmented to strengthen the base. If, on the other hand, all the gold is depleted, then the pyramid is bound to totter and tumble.

References

NSSO (2005a), **Indebtedness of Farmer Households, 59th Round, January-December 2003, May.**

NSSO (2005b), **Access to Modern Technology for Farming, 59th Round, January-December, June.**

NSSO (2005c), **Some Aspects of Farming, 59th Round, January-December 2003, July.**

Oxfam Trust (2005), **Indian Agriculture in Crisis**, Oxfam Trust, New Delhi.

Patnaik, Utsa (2003), 'Food Stocks and Hunger: The Causes of Agrarian Distress', Social Scientist, July-August, pp. 15-41.

Rao, C.H. (2004), 'Preface' *State of the Indian Farmer, A Millennium Study,* Ministry Of Agriculture, Government of India, New Delhi and Academic Foundation, New Delhi.

Sainath, P (2006b), Creative Solutions, Sarkari Style' **Hindu**, March.

Sainath, P (2006b), Vidharbha: The Forced Privatisation of Cotton', **Hindu**, March.

Sainath, P (2006c), Vidharbha Suicides: A Scenario of Post-mortems 24*7', **Hindu**, March.

Singh, Surjit (1999), "Rural Credit In Rajasthan: The Farmer's Woes', **IDSJ WP.**

Singh, Surjit (2005a), 'Agriculture Credit in the Post-Reform Period: Some Concerns', **IDSJ, WP No. 145,** June.

Singh, Surjit (2005b), 'Credit, Crop Insurance and Subsistence Farmers: Recent Evidence and Concerns' a paper in a Seminar organised by IHD, New Delhi.

Singh, Surjit (2005c), 'Institutional Finance and Economic Reforms: A Regional Perspective' a paper in national Seminar on "Economic Reforms" organised by IHD, ISID and Indian Economic Association, New Delhi.

Singh, Surjit (2005d), **Rice in Punjab: A Hard Bargain for Small Rice Growers, IRS, Jaipur, September.**

Singh, Surjit (2005e), **Impact of Agreement on Agriculture on Small-Scale Rice Producers in India, PAN-Up, Malyasia.**

Singh, Surjit and V. Sagar (2004), **Agriculture Credit in India,** *State of the Indian Farmer, A Millennium Study, Volume 7,* Ministry Of Agriculture, Government of India, New Delhi and Academic Foundation, New Delhi.

Vyas, V.S. (2004.), 'Agrarian Distress: Strategies to Protect Vulnerable Sections', **Economic and Political Weekly**, 39 (52): 5576- 5582.

Vyas, V.S and Surjit Singh (2005), **Agricultural Insurance in India: Performance and Need for Reform,** a report submitted to Agriculture Insurance Company of India, New Delhi.

Table 1: NPA of Public Sector Banks (%) as on March end 2004

Banks	Percentage to Total					
	Agri Culture	SSI	Others	Priority Sector	Public Sector	Non-priority Sector
Nationalised Banks	13.55	18.74	15.46	47.74	1.12	51.14
Allahabad Bank	17.99	13.36	22.52	53.87	1.30	44.82
Andhra Bank	17.30	18.93	20.79	57.02	1.32	41.66
Bank of Baroda	13.41	16.44	9.93	39.79	0.09	60.12
Bank of India	16.11	19.10	12.89	48.10	1.81	50.09
Bank of Maharashtra	21.45	21.23	19.32	62.00	0.00	38.00
Canara Bank	13.64	13.99	14.45	42.08	0.13	57.79
Central Bank of India	14.87	22.10	18.80	55.78	0.68	43.54
Corporation Bank	13.25	10.50	22.57	46.32	2.11	51.57
Dena Bank	11.15	20.10	12.58	43.84	1.46	54.70
Indian Bank	14.09	29.40	24.23	67.73	0.79	31.48
Indian Overseas Bank	9.19	24.15	11.73	45.06	1.34	53.59
Oriental Bank of Commerce	10.67	25.36	12.06	48.10	0.42	51.48
Punjab & Sind bank	10.73	12.93	10.24	33.90	1.69	64.42
Punjab National Bank	10.15	19.87	12.35	42.38	1.39	56.23
Syndicate Bank	14.11	19.22	17.36	50.69	3.11	46.20
UCO Bank	12.21	11.00	19.91	43.11	1.00	55.89
Union Bank of India	12.40	20.60	16.97	49.96	0.05	49.99
United Bank of India	18.25	20.36	29.32	67.93	6.31	25.76
Vijaya Bank	23.47	15.45	19.35	58.27	0.44	41.29
State Bank Group	16.50	15.04	15.53	47.07	1.45	51.48
State Bank of India	17.95	14.71	16.05	48.70	0.92	50.38
State Bank of B &J	12.43	20.15	16.51	49.09	1.73	49.18
State Bank of Hyd.	3.88	10.59	8.47	22.94	4.85	72.20
State Bank of Indore	18.66	13.29	22.91	54.86	1.72	43.41
State Bank of Mysore	11.98	19.50	10.68	42.16	0.83	57.01
State Bank of Patiala	14.40	16.16	15.93	46.49	7.98	45.54
State Bank of Saurashtra	19.94	16.84	12.97	49.75	9.02	41.23
State Bank of Travancore	9.90	17.82	14.26	41.97	0.31	57.72
Public Sector Bank	14.44	17.62	15.48	47.54	1.22	51.24

Table 2: NPA of Private Sector Banks (%) as on March end 2004

Banks	Percentage to Total					
	Agri Culture	SSI	Others	Priority Sector	Public Sector	Non-priority Sector
Old Private Sector Banks	6.55	19.52	14.87	40.94	0.19	58.87
Bank of Rajasthan Ltd.	7.01	9.54	11.12	27.67	0.00	72.33
Bharat Overseas Bank	9.48	18.69	15.35	43.52	0.00	56.48
Catholic Syrian Bank Ltd.	2.01	22.30	26.95	51.25	0.00	48.75
City Union Bank Ltd.	3.33	27.92	9.86	41.11	0.00	58.89
Dhanalakshmi Bank Ltd.	0.76	20.93	40.40	62.09	0.00	37.91
Federal Bank Ltd.	7.63	13.97	21.00	42.60	1.38	56.02
Ganesh Bank of Kurundwad	7.22	6.82	9.87	23.91	0.00	76.09
ING Vysya Bank Ltd.	21.09	16.45	13.46	51.00	0.00	49.00
Jammu & Kashmir Bank	2.38	17.69	18.47	38.54	0.00	61.46
Karnataka Bank Ltd.	6.72	17.97	6.04	30.73	0.00	69.27
Karur Vysya Bank Ltd.	1.88	28.37	6.29	36.54	0.00	63.46
Lakshmi Vilas Bank Ltd.	4.50	21.17	20.20	45.87	0.00	54.13
Lord Krishna Bank Ltd.	1.01	9.47	3.62	14.09	0.00	85.91
Nainital Bank Ltd.	15.23	14.40	40.52	70.16	0.00	29.84
Ratnakar Bank Ltd.	8.68	22.01	20.47	51.16	0.00	48.84
Sangli Bank Ltd.	24.89	17.95	6.31	49.16	0.06	50.78
SBI Commercial & International Bank Ltd.	0.00	0.82	0.00	0.82	0.00	99.18
South Indian Bank Ltd.	7.19	38.56	18.92	64.67	0.00	35.33
Tamilnad Mercantile Bank	5.97	27.51	13.46	46.94	0.00	53.06
United Western Bank Ltd.	7.35	13.87	13.74	34.97	0.00	65.03
New Private Sector Banks	2.87	6.78	1.78	11.43	1.11	87.46
Bank of Punjab Ltd.	0.41	0.94	2.76	4.12	0.00	95.88
Centurion Bank Ltd.	0.00	0.00	3.81	3.81	0.00	96.19
Development Credit Bank	0.34	25.36	11.37	37.07	0.00	62.93
Global Trust Bank Ltd.	3.47	11.79	0.00	15.26	0.00	84.74
HDFC Bank ltd.	0.00	7.59	0.00	7.59	0.00	92.41
ICICI Bank Ltd.	2.57	3.27	0.05	5.88	2.17	91.94
IDBI Bank Ltd.	9.26	7.86	23.83	40.94	0.00	59.06
Indusland Bank Ltd.	11.07	7.35	12.56	30.99	0.00	69.01
Kotak Mahindra Bank Ltd.	0.65	0.00	24.05	24.70	0.00	75.30
UTI Bank Ltd.	1.71	10.94	0.00	12.66	0.00	87.34
Private Sector Banks	4.44	12.19	7.35	23.97	0.72	75.30

Table 3: Distribution of Indebted Farmers Households by Social Groups

States	ST	SC	OBC	Others	Total
Andhra Pradesh	10.8	16.8	47.7	24.7	100
Arunachal Pradesh	48.6			51.4	100
Assam	7.1	10.0	21.3	61.6	100
Bihar	2.9	17.0	59.8	20.4	100
Chhattisgarh	30.8	16.7	49.2	3.3	100
Gujarat	22.8	6.6	36.2	34.4	100
Haryana	0.5	21.8	32.6	45.1	100
Himachal Pradesh	6.7	27.8	17.7	47.9	100
Jammu & Kashmir		18.9	4.6	76.5	100
Jharkhand	23.9	15.6	48	12.5	100
Karnataka	9.8	10.8	43	36.4	100
Kerala	1.6	4.5	49.6	44.3	100
Madhya Pradesh	15.9	18.6	47.8	17.6	100
Maharashtra	9.3	8.6	34.5	47.7	100
Manipur	22.9		57.4	19.7	100
Meghalaya	92.2		5.9	4.9	100
Mizoram	100.0				100
Nagaland	96.9		2.7	0.3	100
Orissa	23.3	14.2	44.1	18.5	100
Punjab	0.2	26.1	15.8	57.9	100
Rajasthan	20.8	16.5	47	15.7	100
Sikkim	26.4	4.6	34.5	34.5	100
Tamil Nadu	4.2	21.9	72.9	1.0	100
Tripura	41.4	17.0	14.9	26.7	100
Uttar Pradesh	1.8	25.7	55.7	16.8	100
Uttaranchal		36.4	19.0	44.6	100
West Bengal	5.7	29.6	7.4	57.3	100
Uts	26.1	9.7	51.5	12.7	100
All-India	10.0	18.0	43.9	28.1	100

Table 4: Distribution of Indebted Farmer Households by Source of Income

States	Cultivation	Farming Other Than cultivation	Other agricultural activity	Others	Total
Andhra Pradesh	54.4	4.3	5.8	35.6	100
Arunachal Pradesh	76.4	0.0	1.4	22.2	100
Assam	61.0	1.6	0.0	37.5	100
Bihar	51.6	1.8	3.6	43.2	100
Chhattisgarh	59.6	3.9	2.9	33.6	100
Gujarat	62.9	2.6	4.4	30.2	100
Haryana	59.8	3.8	2.1	34.4	100
Himachal Pradesh	41.2	1.9	3.5	53.5	100
Jammu & Kashmir	39.1	3.2		57.9	100
Jharkhand	49.1	1.4	3.6	45.8	100
Karnataka	60.2	2.8	6.5	30.5	100
Kerala	14.4	14.1	10.1	61.3	100
Madhya Pradesh	64.0	1.4	5.7	29.0	100
Maharashtra	62.6	1.7	2.4	33.3	100
Manipur	50.4	8.1	2.6	39.1	100
Meghalaya	78.4	2.9	5.9	13.7	100
Mizoram	76.6	8.2		15.8	100
Nagaland	69.4	0.7		29.9	100
Orissa	52.0	1.1	4.8	42.1	100
Punjab	52.7	2.0	4.0	41.4	100
Rajasthan	58.4	4.3	3.1	34.3	100
Sikkim	51.1	2.9		46.6	100
Tamil Nadu	50.7	5.7	3.1	40.5	100
Tripura	69.9	1.1	1.7	27.2	100
Uttar Pradesh	66.4	2.6	1.8	29.3	100
Uttaranchal	67.4	0.9	0.0	31.3	100
West Bengal	55.5	2.2	5.6	36.8	100
Uts	47.6	7.8	13.7	30.9	100
All-India	56.9	3.2	4.1	35.7	100

Table 5: Indebted Farmers Households By Land Size

Land Size Hectares	% of Farmers HHs Total	Indebted	Prevalence rate of Indebted ness %	Amount of Outstanding Loan (Rs.) per Farmer HH
< 0.01	1.4	1.3	45.3	6121
0.01-0.40	32.8	30.0	44.4	6545
0.41-1.00	31.7	29.8	45.6	8623
1.01-2.00	18.0	18.8	51.0	13762
2.01-4.00	10.5	12.5	58.2	23456
4.01-10.00	4.8	6.4	65.1	42532
10.00+	0.8	1.2	66.4	76232
All Size	100.0	100.0	48.6	12585

Table 6: Distribution of Indebted Farmer Households by Land Size and States

States	Land Size (hectare) < 0.01	0.01 -0.40	0.41 -1.00	1.01 -2.00	2.01 -4.00	4.01 -10.00	10.00+	All Sizes
Andhra Pradesh	0.4	19.2	36.1	21.8	15.1	6.6	0.7	100
Arunachal Pradesh	9.7	0.0	18.1	44.4	27.8	0.0	0.0	100
Assam	0.3	33.2	37.1	20.8	8.1	0.5	0.0	100
Bihar	1.8	58.0	27.1	9.2	2.8	0.7	0.6	100
Chhattisgarh	0.1	11.4	33.1	30.6	16.9	7.5	0.4	100
Gujarat	4.6	16.1	25.0	21.7	18.3	13.2	1.1	100
Haryana	3.8	30.5	18.0	18.3	19.7	8.8	0.9	100
Himachal Pradesh	0.0	49.1	27.2	15.6	6.3	1.9	0.0	100
Jammu & Kashmir	0.0	35.8	37.1	13.7	12.6	0.9	0.0	100
Jharkhand	0.8	50.6	28.1	15.6	2.7	0.9	1.2	100
Karnataka	0.5	13.9	36.3	22.8	15.9	9.3	1.2	100
Kerala	0.0	66.2	21.5	9.1	2.6	0.5	0.1	100
Madhya Pradesh	0.4	8.0	24.6	27.1	23.1	13.0	3.9	100
Maharashtra	0.7	11.2	24.1	26.2	23.3	12.2	2.4	100
Manipur	0.0	48.3	31.8	18.6	1.1	0.2	0.0	100
Meghalaya	0.0	6.9	67.6	15.7	11.8	0.0	0.0	100
Mizoram	0.0	4.9	53.3	31.0	10.9	0.0	0.0	100
Nagaland	2.0	7.1	55.4	33.7	1.7	0.0	0.0	100
Orissa	0.3	23.5	46.5	20.6	7.3	1.7	0.0	100
Punjab	2.7	39.8	10.8	15.8	17.0	11.8	2.2	100
Rajasthan	1.0	17.5	25.4	19.8	17.8	14.1	4.5	100
Sikkim	0.0	33.3	48.9	14.9	2.9	0.0	0.0	100
Tamil Nadu	1.9	32.7	38.0	15.4	9.3	2.2	0.4	100
Tripura	1.0	40.2	53.5	5.3	0.0	0.0	0.0	100
Uttar Pradesh	2.5	39.9	28.9	17.4	7.8	3.4	0.3	100
Uttaranchal	0.3	45.1	27.3	21.2	5.9	0.0	0.0	100
West Bengal	0.7	58.2	29.8	8.5	2.4	0.4	0.0	100
Uts	3.0	51.6	20.2	11.6	9.7	3.2	0.8	100
All-India	1.3	29.9	29.8	18.9	12.5	6.4	1.2	100

Table 7: Average Amount of Outstanding Loans (Rs.) Per Farmer Households by States

States	SC	ST	OBC	Others	Total
Andhra Pradesh	12760	12720	23697	37802	23965
Arunachal Pradesh	265	0	0	1973	493
Assam	391	1141	598	971	813
Bihar	3619	3161	4010	6814	4476
Chhattisgarh	1545	5386	5944	8816	4122
Gujarat	7981	9175	13800	26333	15526
Haryana	23555	13341	26226	31548	26007
Himachal Pradesh	5308	11427	16405	7662	9618
Jammu & Kashmir	0	931	1029	2346	1903
Jharkhand	746	2992	3181	3304	2205
Karnataka	11259	6405	17210	24901	18135
Kerala	10832	13308	33116	38013	33907
Madhya Pradesh	4812	8910	15628	25411	14218
Maharashtra	6379	8845	18205	21417	16973
Manipur	536	0	3978	3923	2269
Meghalaya	71	0	61	98	72
Mizoram	1937	0	0	0	1876
Nagaland	1078	0	191	132	1030
Orissa	2360	4850	7845	10439	5871
Punjab	118495	10399	21862	66147	41576
Rajasthan	12018	16705	22009	18538	18372
Sikkim	2790	586	1543	2192	2053
Tamil Nadu	21023	12786	27355	23782	23963
Tripura	2656	3239	4156	2718	2977
Uttar Pradesh	6706	4893	7280	11290	7425
Uttaranchal	0	951	4184	914	1108
West Bengal	2349	4298	5816	6118	5237
UTs	4931	6411	19986	7920	10931
All-India	5506	7167	13489	18118	12585

Table 8: Distribution of Outstanding Loan Taken by Farmer Households by Purpose of Loan

States	*Purpose of Loan*								
	Capital Expenditure in Farm Business	Current in Business	Non-farm	Consumption expenditure	Marriages & ceremonies	Education	Medical treatment	Other expenditure	All
Andhra Pradesh	23.4	38.1	3.2	11.5	9.6	1.4	2.4	10.5	100
Arunachal Pradesh	4.4	5.8	0.5	15.9	0.0	20.3	12.0	41.1	100
Assam	16.6	6.7	16.2	12.4	11.8	0.1	1.5	34.8	100
Bihar	30.8	8.6	7.6	6.4	22.9	2.3	10.2	11.2	100
Chhattisgarh	40.3	30.0	8.2	6.7	6.4	0.3	3.4	4.7	100
Gujarat	20.3	50.3	3.9	6.3	10.2	0.5	3.0	5.6	100
Haryana	36.0	26.2	6.8	4.8	14.0	0.0	2.0	10.3	100
Himachal Pradesh	9.4	10.1	29.0	6.6	10.2	0.9	2.9	30.9	100
Jammu & Kashmir	26.0	3.2	24.1	18.3	9.3	0.0	2.0	17.1	100
Jharkhand	27.2	5.3	24.8	10.5	9.8	0.0	0.9	21.6	100
Karnataka	30.7	37.5	9.8	5.6	7.4	0.6	0.2	8.1	100
Kerala	11.0	10.4	22.8	10.2	11.2	1.4	2.5	30.5	100
Madhya Pradesh	47.0	21.3	1.4	9.6	14.4	0.1	3.6	2.7	100
Maharashtra	37.9	37.5	4.8	4.2	4.9	0.9	1.5	8.3	100
Manipur	0.4	3.0	12.4	11.3	9.3	8.7	22.0	33.1	100
Meghalaya	32.1	46.4	0.0	14.2	0.1	0.2	0.0	6.9	100
Mizoram	80.7	0.0	0.2	12.6	0.0	1.2	0.0	5.3	100
Nagaland	11.5	6.0	18.9	12.7	4.4	8.1	0.8	37.6	100
Orissa	28.9	24.4	11.5	11.4	14.0	0.1	2.9	6.9	100
Punjab	26.4	36.0	4.4	8.5	10.2	0.0	2.6	12.0	100
Rajasthan	37.5	19.7	2.2	13.8	17.6	0.8	3.9	4.4	100
Sikkim	12.2	4.9	22.1	20.4	0.2	0.0	0.6	39.6	100
Tamil Nadu	24.3	25.1	5.5	13.1	8.7	2.6	4.1	16.6	100
Tripura	26.3	15.7	17.1	6.8	4.2	0.0	1.7	28.1	100
Uttar Pradesh	40.3	20.6	7.0	6.8	11.8	0.2	6.1	7.1	100
Uttaranchal	18.4	15.8	17.3	9.2	7.4	0.0	2.2	29.7	100
West Bengal	24.4	21.3	10.3	7.2	11.1	0.5	5.1	20.1	100
Uts	9.0	17.1	5.6	12.3	19.0	0.1	1.4	35.3	100
All-India	30.6	27.8	6.7	8.8	11.1	0.8	3.3	10.8	100

Table 9: Distribution of Outstanding Loan taken by Farmer Households by Source of Loan

States	*Source of Loan*								
	Govt.	Co-op Society	Bank	Money lender	Trader	Relatives & Friends	Doctor, lawyer etc.	Others	All
Andhra Pradesh	1.0	10.4	20.0	53.4	4.8	5.3	0.9	4.1	100
Arunachal Pradesh	6.1	0.0	20.8	0.0	15.9	50.7	0.0	6.5	100
Assam	7.0	2.7	27.8	15.5	12.0	24.7	0.5	9.9	100
Bihar	2.2	2.5	370.1	32.8	1.1	12.8	1.2	10.6	100
Chhattisgarh	1.3	20.6	50.5	13.0	4.2	6.3	0.7	3.5	100
Gujarat	0.5	41.8	27.2	6.5	4.4	17.7	0.9	1.0	100
Haryana	1.1	23.9	42.6	24.1	3.1	3.4	1.5	0.4	100
Himachal Pradesh	6.1	11.6	47.6	7.2	5.5	17.0	0.1	1.9	100
Jammu & Kashmir	13.1	0.2	54.3	1.1	15.5	15.5	0.0	0.2	100
Jharkhand	3.9	4.5	55.7	19.0	1.7	13.6	0.4	1.2	100
Karnataka	1.9	16.9	50.1	20.0	1.9	6.8	0.4	2.1	100
Kerala	4.9	28.3	49.1	7.4	1.7	6.6	1.0	0.9	100
Madhya Pradesh	1.9	16.9	38.1	22.6	9.0	10.1	0.5	0.8	100
Maharashtra	1.2	48.5	34.1	6.8	0.8	5.9	0.3	2.4	100
Manipur	1.5	0.0	16.7	32.9	4.0	40.1	0.0	4.9	100
Meghalaya	6.0	0.0	0.0	12.8	0.3	80.9	0.0	0.0	100
Mizoram	24.3	3.1	49.9	0.0	3.3	19.3	0.0	0.0	100
Nagaland	7.5	7.7	53.6	0.3	15.3	15.5	0.0	0.0	100
Orissa	13.0	18.1	43.7	14.8	0.8	8.4	0.1	1.0	100
Punjab	1.9	17.6	28.4	36.3	8.2	6.3	0.6	0.7	100
Rajasthan	1.3	5.9	27.0	36.5	19.2	6.9	1.8	1.4	100
Sikkim	34.8	0.0	23.0	7.3	22.1	6.7	0.0	6.1	100
Tamil Nadu	2.0	23.3	28.1	39.7	0.4	5.2	0.1	1.1	100
Tripura	16.4	2.8	60.5	2.0	3.9	11.9	0.0	2.5	100
Uttar Pradesh	2.4	6.7	51.2	19.1	2.9	13.8	1.9	2.0	100
Uttaranchal	31.5	4.8	39.8	5.9	1.7	14.9	0.0	1.4	100
West Bengal	10.3	19.2	28.5	13.0	10.7	15.4	0.7	2.3	100
Uts	30.7	14.7	13.6	10.3	6.1	24.5	0.0	0.1	100
All-India	2.5	19.6	35.6	25.7	5.2	8.5	0.9	2.1	100

Table 10: Distribution of Indebted Farmer Households Contracting Loans by Purpose

States	*Purpose of Loan*							
	Capital Expenditure in Farm	Current Expenditure in Business	Non-farm Business	Consumption expenditure	Marriages & ceremonies	Education	Medical treatment	Other expenditure
Andhra Pradesh	26	51	3	26	9	1	4	9
Arunachal Pradesh	4	10	1	39	0	6	18	38
Assam	11	12	7	30	10	1	6	25
Bihar	21	12	5	21	18	1	17	12
Chhattisgarh	27	42	5	23	8	1	5	6
Gujarat	13	56	2	13	13	0	5	8
Haryana	32	35	4	19	14	0	4	14
Himachal Pradesh	14	11	13	29	20	1	8	23
Jammu & Kashmir	4	1	4	85	3	0	0	5
Jharkhand	26	10	11	25	10	0	5	15
Karnataka	21	52	3	19	7	1	1	7
Kerala	16	17	12	27	12	4	8	34
Madhya Pradesh	30	41	4	25	17	0	5	4
Maharashtra	30	53	5	13	6	0	4	6
Manipur	2	5	4	39	7	10	11	26
Meghalaya	35	30	0	25	1	1	0	7
Mizoram	36	0	3	54	0	3	0	5
Nagaland	7	6	4	52	2	12	2	16
Orissa	26	36	8	21	8	0	4	8
Punjab	17	37	5	27	14	1	4	12
Rajasthan	28	29	3	32	16	1	5	8
Sikkim	12	3	6	74	1	0	2	8
Tamil Nadu	20	38	4	34	9	3	7	12
Tripura	15	10	11	36	3	0	2	25
Uttar Pradesh	28	27	5	19	15	1	11	10
Uttaranchal	19	29	17	15	9	0	6	16
West Bengal	22	34	9	25	7	1	8	15
Uts	15	34	3	35	13	1	5	12
All-India	24	37	5	23	11	1	7	11

Table 11: Distribution of Indebted Farmer Households Contracting Loans by Source

States	*Source of Loan*							
	Govt.	Co-op Society	Bank	Money lender	Trader	Relatives & Friends	Doctor, lawyer etc.	Others
Andhra Pradesh	3	20	31	57	9	6	1	4
Arunachal Pradesh	4	0	10	0	33	49	0	21
Assam	3	3	9	10	17	54	1	6
Bihar	2	4	17	44	5	26	2	7
Chhattisgarh	2	37	27	20	17	12	2	5
Gujarat	0	40	23	8	10	29	1	1
Haryana	2	44	30	29	9	9	2	1
Himachal Pradesh	5	24	28	5	22	32	2	4
Jammu & Kashmir	4	1	4	1	88	5	0	0
Jharkhand	6	0	38	22	8	28	1	1
Karnataka	2	23	32	34	5	12	1	3
Kerala	8	46	42	16	6	12	1	5
Madhya Pradesh	4	37	23	22	23	17	2	2
Maharashtra	2	61	29	7	6	11	2	4
Manipur	4	0	2	25	11	57	0	6
Meghalaya	2	0	0	6	0	91	0	0
Mizoram	10	2	21	0	30	37	0	0
Nagaland	4	2	14	0	51	28	0	0
Orissa	2	30	36	23	4	16	0	3
Punjab	1	38	19	28	18	21	1	2
Rajasthan	2	15	21	40	23	14	2	2
Sikkim	6	0	12	3	70	14	0	2
Tamil Nadu	3	33	23	52	2	11	0	2
Tripura	11	3	32	2	29	20	0	4
Uttar Pradesh	4	13	30	26	9	28	3	4
Uttaranchal	8	17	40	7	5	25	0	7
West Bengal	10	19	22	15	29	23	2	4
Uts	9	15	18	30	9	31	0	1
All-India	3	26	27	29	12	18	2	3

Appendix 1: State-wise Distribution of Credit To Agriculture

Year	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Total	Per Account Credit Agriculture	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture
Andaman & Nicobar					Andhra Pradesh			
1991-92	27.97	11.06	15848	6268	52.37	23.94	13656	6242
1992-93	28.78	11.75	16584	6775	51.14	22.40	15301	6702
1993-94	34.07	16.00	13872	6516	51.81	22.77	17140	7533
1994-95	27.46	14.04	14975	7656	51.47	20.36	21773	8615
1995-96	28.16	12.98	20891	9633	53.72	20.85	27218	10564
1996-97	22.91	7.17	21508	6731	50.78	20.31	31059	12424
1997-98	24.92	7.79	25903	8099	51.23	19.81	36964	14294
1998-99	15.27	7.89	52864	27307	50.35	19.60	41432	16128
1999-00	11.19	6.27	73752	41311	50.25	18.75	46010	17171
2000-01	10.07	6.11	106673	64806	49.41	17.99	56246	20482
2001-02	11.19	12.33	213740	235463	48.23	17.54	60497	22001
2002-03	8.16	10.94	222080	297456	49.56	17.07	69438	23911
2003-04	6.55	17.29	169109	446154	47.23	17.93	77110	29267
Arunachal Pradesh					Assam			
1991-92	52.44	9.92	46108	8723	31.88	14.87	18396	8577
1992-93	56.58	12.79	39604	8956	29.90	13.21	18616	8223
1993-94	57.67	9.13	30931	4894	32.33	15.72	17736	8624
1994-95	54.69	16.83	26470	8147	31.86	17.04	18371	9827
1995-96	52.76	13.35	32009	8101	33.39	16.05	19526	9387
1996-97	50.90	15.32	22867	6883	29.98	15.86	20813	11014
1997-98	57.71	18.40	18200	5804	27.78	13.31	23905	11452
1998-99	55.97	19.09	18051	6157	23.74	9.72	35960	14716
1999-00	36.34	14.11	30466	11827	23.36	9.66	41065	16987
2000-01	31.42	10.55	35949	12075	19.76	7.39	58593	21914
2001-02	39.50	9.59	69055	16773	19.97	4.78	123673	29582
2002-03	42.41	11.77	60099	16684	19.20	5.93	112083	34637
2003-04	32.93	9.97	82682	25028	19.28	10.15	69156	36400
Bihar					Chandigarh			
1991-92	42.41	25.24	7440	4428	8.39	9.03	116009	124813
1992-93	42.95	24.73	8232	4739	7.83	13.63	123790	215556
1993-94	42.68	26.13	8779	5376	6.24	21.13	187503	634910
1994-95	42.75	26.74	9970	6235	6.86	3.96	365973	211525
1995-96	42.63	25.52	11062	6621	7.71	6.08	351733	277499
1996-97	39.54	23.44	13934	8262	7.31	6.45	292324	257824
1997-98	37.48	18.81	16720	8393	3.88	6.30	409811	665395
1998-99	36.17	17.45	23414	11296	1.91	3.77	445039	877994
1999-00	36.11	16.37	25483	11554	1.95	5.13	335741	883041
2000-01	38.55	18.59	49723	23983	1.49	4.84	434606	1411810
2001-02	36.41	16.69	60799	27863	1.97	6.34	852879	2745551
2002-03	30.77	16.27	64890	34325	2.06	11.53	975956	5465172
2003-04	30.16	15.34	77642	39492	6.05	10.62	1008452	1769600

Appendix 1: contd.

Year	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture
Dadra & Nagar Haveli					Daman & Diu			
1991-92	47.26	5.46	62880	7268	28.25	2.36	94897	7930
1992-93	48.77	4.15	85892	7305	28.51	2.48	91943	8011
1993-94	47.13	5.15	136340	14892	29.00	2.22	119795	9178
1994-95	38.77	3.17	166215	13596	24.65	2.76	152761	17095
1995-96	37.72	2.18	206989	11974	16.71	2.05	165833	20316
1996-97	29.49	2.48	159703	13440	16.43	2.15	196426	25740
1997-98	25.46	2.39	276021	25943	13.96	1.24	343731	30479
1998-99	31.08	3.73	362169	43404	8.75	1.88	595338	128141
1999-00	32.47	1.33	703577	28736	10.89	0.53	617761	30142
2000-01	31.67	0.97	827300	25305	8.27	1.55	624128	116625
2001-02	25.47	0.66	985175	25699	9.32	0.78	768244	64516
2002-03	27.04	0.42	936478	14593	17.05	0.87	773890	39459
2003-04	21.59	5.12	644452	152852	4.01	1.93	539399	259109
Delhi					Goa			
1991-92	2.16	1.55	126669	91237	21.46	7.13	34853	11574
1992-93	2.23	1.40	210859	132447	21.48	7.25	38229	12902
1993-94	2.47	1.25	335034	169872	19.59	6.77	39266	13562
1994-95	2.00	1.35	301985	204013	17.70	5.06	62546	17869
1995-96	4.88	3.67	280681	211545	15.48	5.22	84303	28423
1996-97	1.40	1.53	312154	340869	12.62	4.17	93218	30802
1997-98	1.72	0.96	421928	236482	11.23	4.08	119928	43579
1998-99	0.38	3.89	413630	4203942	8.77	3.72	132692	56183
1999-00	1.05	1.44	503443	692484	8.93	4.12	129625	59819
2000-01	0.75	2.59	348318	1205354	7.84	2.99	169141	64570
2001-02	0.48	3.03	537678	3400658	6.33	1.85	177175	51837
2002-03	0.48	4.29	687686	6140721	7.23	2.06	195634	55698
2003-04	0.99	4.67	807015	3812558	7.32	2.51	226783	77680
Gujarat					Haryana			
1991-92	43.76	15.72	36524	13119	48.81	26.02	25546	13619
1992-93	45.39	17.50	41711	16080	46.04	24.14	29870	15662
1993-94	45.18	13.72	46427	14104	46.41	25.98	31293	17518
1994-95	46.11	11.42	59008	14610	46.78	22.46	38591	18524
1995-96	46.07	10.74	75922	17705	44.79	20.54	50959	23363
1996-97	44.13	9.82	78102	17389	43.21	20.28	59038	27709
1997-98	43.53	10.16	94958	22165	40.64	17.88	75996	33438
1998-99	41.82	10.05	116539	27999	38.05	18.77	84541	41705
1999-00	41.02	9.20	126676	28407	39.18	19.01	85894	41684
2000-01	40.78	8.85	141397	30673	44.92	17.66	99669	39176
2001-02	41.84	10.51	168828	42415	42.04	21.29	122081	61820
2002-03	44.27	10.11	197789	45172	41.86	19.66	157358	73900
2003-04	41.18	9.78	223768	53155	43.61	21.66	165883	82392

Appendix 1: contd.

Year	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Total	Per Account Credit Agriculture	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture
Himachal Pradesh					Jammu & Kashmir			
1991-92	41.42	14.52	18471	6476	33.26	9.53	37778	10822
1992-93	38.03	12.63	20776	6901	30.09	6.50	35509	7672
1993-94	36.11	14.95	21522	8910	25.94	7.67	28666	8481
1994-95	38.23	15.06	26865	10585	21.33	7.70	29100	10511
1995-96	36.93	10.73	34788	10107	23.81	8.16	30797	10556
1996-97	36.75	12.73	34424	11920	27.67	7.38	43212	11527
1997-98	34.31	10.64	41054	12733	28.51	6.07	73283	15608
1998-99	25.48	10.67	40138	16816	24.71	5.41	85322	18665
1999-00	28.20	10.88	46977	18124	20.27	5.42	88384	23625
2000-01	29.33	10.23	54678	19076	19.24	5.12	95958	25529
2001-02	30.59	10.42	81237	27675	16.87	4.74	126067	35450
2002-03	34.52	10.77	109168	34070	14.45	4.93	122495	41825
2003-04	35.92	9.26	124057	31984	10.77	4.54	162990	68705
Karnataka					Kerala			
1991-92	37.94	20.51	15756	8519	35.79	16.98	13017	6174
1992-93	44.29	21.45	18866	9140	34.97	15.99	15420	7051
1993-94	44.59	20.79	22772	10618	35.27	14.97	17322	7349
1994-95	43.74	19.69	28598	12874	35.37	14.66	22119	9166
1995-96	43.31	16.91	38578	15059	35.20	14.29	26736	10855
1996-97	41.65	16.67	43691	17491	34.09	13.24	29935	11624
1997-98	41.59	16.21	53390	20808	33.99	13.82	33973	13811
1998-99	38.46	16.89	58941	25877	34.11	13.33	40054	15653
1999-00	39.88	17.57	59044	26017	34.67	13.06	45881	17278
2000-01	38.52	15.52	76357	30769	34.91	13.29	50522	19231
2001-02	29.89	15.44	77538	40052	34.94	11.90	60202	20497
2002-03	28.90	14.51	92269	46327	35.24	11.80	66854	22394
2003-04	28.87	15.07	108163	56452	38.55	13.40	79447	27623
Lakshadweep					Madhya Pradesh			
1991-92	34.25	21.52	8857	5565	41.38	23.22	14543	8160
1992-93	41.07	20.74	9494	4795	41.73	23.50	17124	9644
1993-94	43.27	20.26	11907	5576	43.24	22.95	18796	9977
1994-95	40.24	18.91	13526	6355	43.54	20.17	21272	9854
1995-96	36.63	12.81	26207	9164	44.24	18.18	30371	12484
1996-97	33.77	16.56	18182	8913	42.72	19.31	33954	15349
1997-98	32.16	13.51	20307	8532	42.66	19.57	44366	20354
1998-99	28.60	11.76	27013	11111	41.59	20.07	52954	25561
1999-00	24.96	14.04	29037	16327	39.40	19.71	60326	30180
2000-01	24.85	15.38	39683	24570	42.12	18.39	69862	30509
2001-02	20.95	8.57	35176	14388	37.52	19.51	81334	42297
2002-03	20.18	10.77	32146	17157	36.40	19.97	88359	48473
2003-04	18.56	7.37	38000	15086	36.04	21.63	100615	60383

Appendix 1: contd.

Year	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture
Maharashtra					Manipur			
1991-92	38.90	5.92	43911	6683	23.66	13.15	16217	9016
1992-93	38.04	5.16	78169	10610	24.54	12.93	15691	8270
1993-94	38.79	4.67	88430	10644	25.22	13.40	15476	8224
1994-95	39.88	3.90	134441	13133	24.99	13.20	18112	9570
1995-96	37.24	4.19	157570	17742	26.14	12.82	19245	9442
1996-97	37.00	4.42	174050	20796	25.45	14.52	20969	11960
1997-98	37.28	4.15	214817	23933	26.58	13.71	24383	12574
1998-99	28.31	4.12	200873	29202	22.06	12.23	28537	15818
1999-00	28.48	3.79	262882	35018	21.35	10.93	34477	17647
2000-01	30.52	3.46	332089	37611	23.84	13.99	45581	26754
2001-02	25.77	3.78	345168	50652	19.76	11.84	50816	30456
2002-03	22.66	3.86	359496	61234	20.35	10.59	53277	27731
2003-04	14.38	4.73	320492	105383	22.86	10.00	62382	27300
Meghalaya					Mizoram			
1991-92	56.96	26.91	12926	6107	43.41	22.88	17896	9432
1992-93	56.92	23.37	13212	5425	44.91	18.20	24845	10066
1993-94	54.54	21.79	14011	5596	44.86	19.51	26452	11506
1994-95	52.19	17.88	35343	12105	44.96	23.44	31295	16316
1995-96	56.46	21.65	21386	8200	45.22	16.01	22320	7900
1996-97	50.55	22.41	15535	6886	45.18	19.81	18674	8188
1997-98	48.81	17.47	20545	7355	40.91	16.24	25083	9956
1998-99	43.28	12.21	30306	8547	25.71	11.93	27754	12876
1999-00	41.42	13.55	28480	9314	26.97	10.77	35687	14243
2000-01	36.07	9.71	38152	10267	23.88	10.37	43867	19058
2001-02	42.25	9.03	65808	14065	30.82	10.41	66657	22513
2002-03	35.36	5.15	94263	13718	22.61	5.38	71354	16971
2003-04	28.43	7.00	146236	36021	24.39	6.97	78896	22556
Nagaland					Orissa			
1991-92	38.51	19.93	25759	13329	43.49	20.00	7342	3376
1992-93	45.55	20.42	19728	8845	40.60	19.82	8333	4069
1993-94	47.67	21.19	20474	9102	40.77	21.42	8749	4597
1994-95	46.00	21.50	23779	11112	39.90	20.26	10353	5258
1995-96	51.96	18.74	28981	10451	40.29	19.49	12456	6024
1996-97	46.27	16.43	30521	10837	38.72	20.49	14611	7734
1997-98	46.68	19.51	25428	10627	37.45	20.77	17575	9747
1998-99	45.92	16.22	35584	12570	37.60	18.16	21002	10143
1999-00	36.16	20.55	37044	21050	37.50	17.20	22961	10534
2000-01	37.15	16.33	47314	20792	37.53	16.35	31336	13648
2001-02	36.23	11.66	68986	22195	34.33	13.20	40229	15475
2002-03	31.08	11.80	58081	22055	32.55	11.34	48346	16847
2003-04	22.20	9.78	68628	30227	29.86	10.81	56658	20512

Appendix 1: contd.

Year	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture
Pondicherry					Punjab			
1991-92	46.25	14.02	20566	6235	46.26	24.59	31170	16568
1992-93	39.53	12.71	21302	6849	43.15	22.66	36143	18982
1993-94	44.46	12.23	25554	7030	42.20	22.71	41261	22203
1994-95	40.66	11.72	31409	9055	42.89	20.66	51758	24925
1995-96	50.30	12.74	41679	10557	43.68	19.03	65147	28376
1996-97	49.97	21.75	48777	21230	42.63	18.93	68961	30618
1997-98	51.77	24.77	53741	25713	40.79	16.46	86901	35068
1998-99	30.05	10.18	49812	16865	39.40	18.80	96937	46258
1999-00	33.42	9.15	57983	15879	38.73	19.58	101507	51302
2000-01	28.41	9.32	65413	21466	44.83	18.94	115357	48751
2001-02	33.68	9.41	85110	23791	40.70	17.88	134198	58965
2002-03	28.02	7.74	95390	26350	40.83	19.18	172664	81128
2003-04	27.72	9.19	102900	34121	40.14	19.86	182820	90426
Rajasthan					Sikkim			
1991-92	46.46	26.89	16563	9589	67.98	13.51	15674	3115
1992-93	46.00	25.84	19627	11024	45.86	17.39	12698	4814
1993-94	46.04	24.15	20765	10892	71.56	28.97	16692	6756
1994-95	46.76	23.34	25107	12532	63.83	17.79	20502	5714
1995-96	47.45	20.78	27378	11993	69.34	17.23	20070	4986
1996-97	44.03	20.95	33271	15834	59.48	17.17	21988	6346
1997-98	44.43	19.91	43306	19406	57.52	16.87	26493	7768
1998-99	43.49	21.23	50335	24576	51.19	12.46	42068	10240
1999-00	42.55	22.65	56895	30292	41.83	11.79	42219	11900
2000-01	45.80	23.23	64788	32858	30.83	9.53	63541	19649
2001-02	41.96	23.35	78607	43749	31.81	3.90	104325	12786
2002-03	29.59	25.14	87000	73904	26.38	7.13	102973	27822
2003-04	43.81	22.45	106255	54456	21.66	5.66	107594	28100
Tamil Nadu					Tripura			
1991-92	50.02	15.59	23067	7191	45.29	22.23	5286	2595
1992-93	44.27	13.99	25919	8189	45.58	21.68	5828	2771
1993-94	48.43	14.37	28202	8367	45.10	22.34	6229	3085
1994-95	47.50	12.34	35733	9284	44.76	22.84	6522	3328
1995-96	49.86	12.14	45383	11052	45.08	23.34	6744	3492
1996-97	46.43	11.42	55563	13661	36.06	23.59	8509	5566
1997-98	49.38	11.83	63736	15270	39.67	22.22	9382	5256
1998-99	42.43	10.20	73756	17736	31.76	22.19	11287	7885
1999-00	43.18	8.96	86541	17966	42.18	21.80	9423	4869
2000-01	40.65	8.15	108490	21760	28.36	19.35	15414	10516
2001-02	41.36	7.79	113536	21387	43.52	19.08	12467	5464
2002-03	31.72	7.93	103134	25773	41.18	17.93	16087	7006
2003-04	23.57	9.68	78595	32281	32.35	14.13	22955	10024

Appendix 1: contd.

Year	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture	Share of Agriculture in Accounts	Share of Agriculture in Credit	Per Account Credit Rs. Total	Per Account Credit Rs. Agriculture
Uttar Pradesh					West Bengal			
1991-92	41.23	22.22	12163	6554	35.37	7.84	23629	5235
1992-93	46.42	21.22	15663	7158	32.93	7.23	27489	6034
1993-94	46.47	21.66	16818	7838	31.89	6.08	27867	5315
1994-95	46.56	21.69	18481	8610	31.00	5.37	33130	5741
1995-96	46.88	19.72	21729	9138	29.16	5.46	35486	6640
1996-97	45.07	19.10	25397	10766	25.21	5.41	40455	8682
1997-98	45.02	19.18	30483	12991	25.69	4.62	46531	8370
1998-99	44.04	19.68	35180	15720	24.12	4.67	62071	12015
1999-00	43.37	19.69	40877	18562	23.43	4.08	67163	11699
2000-01	47.73	21.28	45834	20437	21.92	4.59	85899	17970
2001-02	45.93	19.95	56179	24404	23.38	4.96	102719	21787
2002-03	48.66	21.92	61159	27551	22.50	5.06	112302	25282
2003-04	48.28	22.04	67910	30996	21.95	7.42	148004	50014

RECENT TREND IN PRODUCTION AND MARKETING OF PADDY IN SELECTED STATES OF INDIA

By

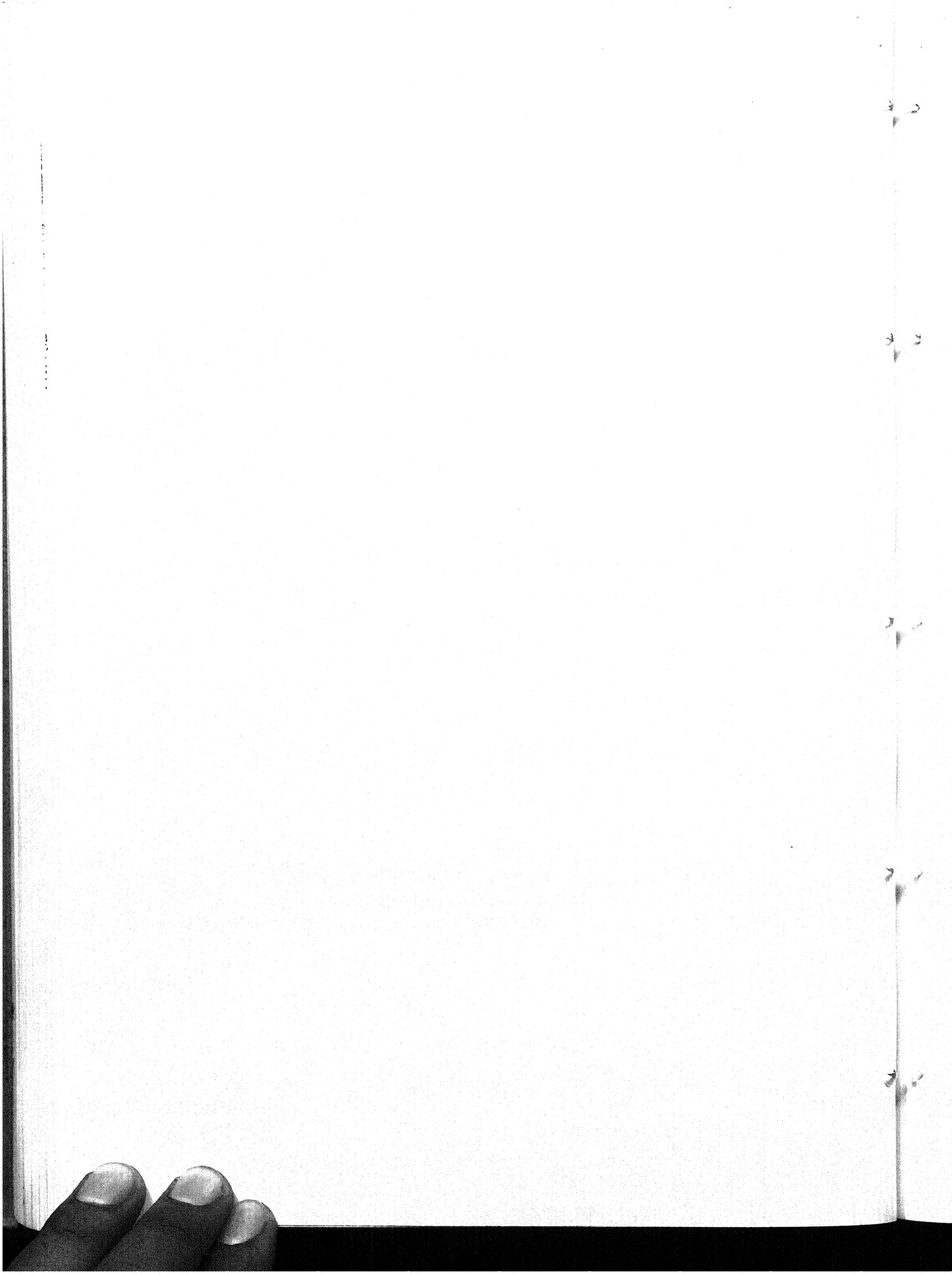
J.P. SINGH

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Recent Trend in Production and Marketing of Paddy in Selected States of India

J.P. Singh
Visiting Fellow
G. B. Pant Social Science Institute, Jhusi, Allahabad

In this paper, the issues relating to marketing of paddy in different states have been examined. Apart from briefly looking into the production performance of rice on the basis of secondary data, extent of marketd surplus, prices received, purchase agencies, time schedule of sale of produce, etc. have been examined on the basis of primary data. Whether farmers are able to receive minimum support prices or not in different states has also be looked into.

Production Performance of Rice

Rice, being largely a Kharif season crop and greatly dependent on monsoon, shows considerable annual fluctuations in its production, prices and marketed suplus. Being the most important crop of the country, both in terms of area and production, it sustains the largest proportion of population for food and the largest proportion of rural population for their livelihood. Rice accounts for 23.8 per cent of the gross cropped area of India and is remotely followed by wheat with 13.8 per cent of the gross cropped area. All other crops command much lower proportion of area.

Although, area, production and yield of rice have shown secular upward trend during the eighties and the nineties, their annual compound growth rates show drastic decline during nineties as compared to eighties (Table 1). The growth in rice production declined from 4.3 per cent to 1.2 per cent, largely because of sharp decline in growth rate of yield from 3.7 per cent to 0.9 per cent. The growth rate of area also declined from 0.57 per cent to 0.24 per cent. This decline in growth rate of yield may be attributable to declining public investment in agriculture leading to slow growth in irrigated area, no major breakthrough in varietal improvement, distribution of seeds of doubtful quality, collapse of agricultural extension system, etc. Therefore, there is a need to bring considerable improvement in investment in capital formation and plant breeding, to which the present government at the Centre seem to be showing considerable commitment.

Table 1

All-India Area, Production and Yield of Rice and their Annual Compound Growth Rates

Year	Area (000 hectares)	Production (000 tones)	Yield (kg. per hectare)
T.E. 1981-82	40091	49736	1241
T.E. 1990-91	42199	72784	1725
T.E. 1993-94	42321	75948	1795
T.E. 2002-03	43239	84257	1949
	Compund Growth Rates Between T.Es.		
81-82 to 90-91	0.57	4.32	3.73
93-94 to 2002-03	0.24	1.16	0.92

Source: Government of India, Ministry of Agriculture, Reports of the Commission for Agricutlrual Costs and Prices for the Crops Sown During 2004-05 Season, 2005, p. 197.

The data on average area, production and yield of rice for triennium ended 1992-93 and 2002-03 alongwith their growth rates in different states are presented in Table 2. At the all-India level, the average rice production increased from 73.95million tones to 83.65 million tones and average yield increased from 1745 kgs to 1932 kgs per hectare. Out of the increase of 9.7 million tones of production between the two points of time, an increase of 2.74 million tones (28.25 per cent) has come from West Bengal, 2.19 million tones (22.58 per cent) from Punjab, 1.09 million tones (11.24 per cent) from Uttar Pradesh, 1.11 million tones (11.4 per cent) from Andhra Pradesh 2.09 million tones (21.55 per cent) from Bihar+Jharkhand, 0.6 million tones (6.19 per cent) from Assam and 0.79 million tones (8.14 per cent) from Haryana.

Table 2

Three Yearly Average and Compound Growth Rate of Area, Production and Yield: Rice

Area: Million Hectare
Production:Million Tonnes
Yield:kg/hectare

State	Average of 1990-91-92-93			Average of 2000-01-02-03			Annual compound growth rate (%)		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
West Bengal	5.74	11.28	1964.12	5.78	14.02	2425.61	0.07	2.20	2.13
Punjab	2.05	6.76	3293.08	2.54	8.95	3523.62	2.15	2.84	0.68
Uttar Pradesh*	5.50	9.79	1779.90	5.46	10.88	1992.67	-0.08	1.06	1.14
Andhra Pradesh	3.85	9.23	2397.66	3.60	10.34	2872.22	-0.67	1.14	1.82
Tamil Nadu	2.05	6.39	3119.02	1.94	6.55	3376.29	-0.55	0.24	0.80
Bihar+Jharkhand	5.00	4.98	995.602	5.10	7.07	1386.27	0.19	3.57	3.37
Assam	2.51	3.26	1296.81	2.57	3.86	1501.95	0.24	1.72	1.48
Orissa	4.46	5.77	1293.72	4.40	5.00	1136.36	-0.14	-1.42	-1.29
Haryana	0.67	1.84	2751.50	0.99	2.63	2656.57	4.01	3.65	-0.35
Karnataka	1.25	2.77	2210.69	1.35	3.10	2296.30	0.75	1.13	0.38
Maharashtra	1.57	2.25	1437.70	1.51	2.14	1417.22	-0.36	-0.50	-0.14
Madhya Pradesh +Chhattisgarh	5.13	5.42	1056.53	5.38	4.52	840.15	0.48	-1.80	-2.27
Kerala	0.55	1.07	1959.71	0.32	0.71	2218.75	-5.20	-4.02	1.25
Gujrat	0.57	0.82	1438.38	0.57	0.70	1228.07	0.04	-1.53	-1.57
All India	42.37	73.95	1745.22	43.29	83.65	1932.32	0.22	1.24	1.02

*The data for Uttaranchal on rice could not be obtained for years 2000-01 to 02-03. Therefore, the growth rate for Uttar Pradesh presented in the table may not be accurate as the data for the first point are inclusive of Uttaranchal, while those for the second point are not.

It can be noted that about two-thirds (67.2 per cent) of the increase in rice production has come from the states of eastern region, i.e. West Bengal, Uttar Pradesh, Bihar+Jharkhand, and Assam. And all these states have shown considerably higher rate of growth in their rice yield than some of the most agriculturally advanced states like Punjab, Haryana and Tamil Nadu. Thus, the potential of increasing rice production in eastern region needs to be exploited through higher investment in infrastructure and greater emphasis on development and adoption of higher yielding varieties.

Looking at the growth rates, it is observed from the table that only in the case of West Bengal, Punjab, Bihar+Jharkhand and Haryana, the growth rate of rice production is more than 2.0 per cent, mainly due to growth in yield in West Bengal and Bihar (including Jharkhand), but due to increase in area in other two states. There has been absolute decline in the yield of rice (to the extent of about a quintal per hectare) in Haryana, while in the case of Punjab, the yield growth rate is an low as 0.7 per cent per annum. But the average yield of these two states in early nineties was much higher than other states, except Tamil Nadu. Despite very sharp increase in growth rate of yield in Bihar + Jharkhand (3.4 per cent per annum), its average yield in TE 2002-03 (1338 kgs per hectare) is substantially lower than the national average (1932 kgs per hectare). Still worse was the case in TE 1992-93 when the average yield of rice in Bihar (including Jharkhand) was only 996 kgs. as compared to the national average of 1715 kgs. Therefore, the fast growth in yield of rice in Bihar (including Jharkhand) was mainly due to its very low base.

The growth rate of rice production was negative in Orissa, Maharashtra, Madhya Pradesh (including Chhatisgarh), Kerala and Gujrat. Whereas negative growth rate in both area and yield was responsible for negative growth in production of rice in Orissa and Maharashtra, it was only the decline in area that was responsible for absolute decline in production in Kerala, but only yield in Madhya Pradesh (including Chhatisgarh) and Gujrat. The remaining states show low to moderate positive growth rate in their rice production. Even in these states, the growth in rice production has largely come from the growth in yield, as the growth rate of area was negative in some of them. As clear from all-India growth rate of area, the possibility of area increase under rice is very low. Therefore, it is the yield increase that

needs a greater push. Overall, the production performance of rice crop during the last about a decade has been quite unsatisfactory. Therefore, there is a need to improve it considerably.

Production and Marketings of Paddy in Different States Based on Sample Data

The subsequent analyses are based on primary level data collected from selected districts for a common study in eight states. These states are Andhra Pradesh (Ramgopal, 2003), Assam (Borah, 2003), Bihar (Sinha, 2004), Haryana (Singh, 2003), Madhya Pradesh (Mishra, 2004), Punjab (Grover et.al., 2003), Tamil Nadu (Lakshminarayanan, 2004), and Uttar Pradesh (Sharma, 2003). The reference year for collection of data was agricultural year 2001-02 for all the states, except Punjab, for which it was 2000-01.

Size Distribution of Selected Farmers

In the above mentioned studies, the sample farmers were selected randomly on the basis of a common study design by stratifying them in five size groups of operated area and selecting them in each size group in relation to probability proportional to their operated area. The size group categorization of farmers was as follows: marginal (<1.0 ha.), Small (1.0 – 2.0 ha.), semi-medium (2.0 – 4.0 ha.), medium (4.0 – 6.0 ha.) and large (above 6.0 ha.). Only in the case of Punjab, the operated area of medium size holdings ranged from 4-10 Ha. and large size holdings above 10 Ha. The number of sample farmers falling into different size groups in selected districts of different states are presented in Table 3. It is seen from the table that the number of sample farmers in different size groups differ widely among the selected districts depending on the pressure of population on land.

Table 3

Distribution of Sample Farmers by Size Groups in Selected Districts 2001-02

(Number)

State	Selected district	Farm Size group					
		Marginal	Small	Semi-medium	Medium	Large	All
Andhra Pradesh	East Godavari	28	16	7	5	4	60
Assam	Jorhat & Nagaon	19	41	36	16	8	120
Bihar	Rohtas	18	23	11	8	-	60
Haryana	Karnal	12	13	19	6	10	60
Madhya Pradesh	Balaghat	12	12	12	12	12	60
Punjab	Sangrur	9	13	15	11	12	60
Tamil Nadu	Villupuram	6	9	12	15	18	60
Uttar Pradesh	Lakhimpur Kheri	40	10	4	3	3	60
	Badaun	31	11	9	5	4	60

Average Size of Holding

The average size of holding by farm size groups in Selected districts are presented in Table 4. Not only the average farm size for the sample as a whole differs widely among the selected districts, but also it differs considerably in individual size groups.

Table 4

Average Operated Area Per Farm by Size Groups

(In hectares)

State	District	Farm Size group					
		Marginal	Small	Semi-medium	Medium	Large	All
Andhra Pradesh	East Godavari	0.85	1.60	2.98	4.80	9.56	2.21
Assam	Jorhat & Nagaon	0.68	1.49	2.93	5.67	9.12	2.86
Bihar	Rohtas	0.94	1.80	2.69	8.77	-	2.63
Haryana	Karnal	0.55	1.39	2.56	4.72	11.33	3.58
Madhya Pradesh	Balaghat	0..69	1.57	2.96	4.59	7.86	3.53
Punjab	Sangrur	0.66	1.45	2.99	4.82	10.83	4.23
Tamil Nadu	Villupuram	0.66	1.48	2.35	4.59	6.82	3.95
Uttar Pradesh	Lakhimpur Kheri	0.47	1.77	3.10	4.75	6.33	1.37
	Badaun	0.68	1.65	2.84	5.08	6.69	1.95

Importance of Paddy Crop in Selected Districts

A very sharp difference is noted in the cropping pattern among the districts, both over-all as well as by farm size groups (Table 5). The percentage of gross cropped area allocated to paddy crop varies between 31 per cent in Lakhimpur-kheri district of U.P. and 99.0 per cent in East Godavari district of Andhra Pradesh. For the districts of Assam, the data on cropping pattern of the sample farmers are not available and hence the share of paddy in the gross cropped area is not presented in the table. It may be mentioned that paddy

Table 5

Percentage of Gross Cropped Area Under Paddy by Farm Size Groups - 200102

State	District	Farm Size group					
		Marginal	Small	Semi-medium	Medium	Large	All
Andhra Pradesh	East Godavari	99.83	100.00	100.00	96.50	97.84	98.74
Bihar	Rohtas	50.62	52.66	52.55	50.73	-	51.63
Haryana	Karnal	42.20	39.41	45.12	45.58	46.97	45.63
Madhya Pradesh	Balaghat	63.82	70.53	63.37	61.95	68.30	65.64
Punjab	Sangrur	26.87	38.97	40.77	42.01	43.53	41.86
Tamil Nadu	Villupuram	100.00	82.20	84.90	80.10	70.20	76.20
Uttar Pradesh	Lakhimpur Kheri	32.92	32.86	29.41	28.24	32.20	31.43
	Badaun	37.76	43.08	39.41	30.14	35.31	36.38

accounts for more than 72 per cent of the gross cropped area in the State and therefore, the share of paddy in the gross cropped area of the sample farmers of Orissa may be at least this

much, if not more. It is seen from the table that in all the selected districts, paddy is quite an important crop.

Productivity of Paddy

The average productivity of paddy per hectare differs very sharply among the selected districts, both for the overall sample and also in individual size groups (Table 6). It is quite high in East Godavari, Sangrur, Karnal and Villupuram districts, but quitre low in Balaghat, Rohtas, and Jorhat and Nagaon districts. Almost the same pattern is observed in individual size groups also.

Table 6

Average Yield of All Varieties of Paddy Per Hectare by Farm by Size Groups – 2001-02

(Quintals/hectares)

State	District	Season	Farm Size group					
			Marginal	Small	Semi-medium	Medium	Large	All
Andhra Pradesh	East Godavari	Kharif	40.55	40.17	43.90	40.08	39.32	40.59
		Rabi	77.84	77.84	79.69	75.98	77.84	77.82
Assam	Jorhat & Nagaon	Sali, Boro, & Ahu	31.63	31.58	29.91	28.94	26.96	29.38
Bihar	Rohtas	Kharif	24.50	27.65	28.78	31.75	-	28.17
Haryana	Karnal	Kharif	47.86	47.76	51.22	47.53	52.02	50.87
Madhya Pradesh	Balaghat	Kharif	23.70	22.21	22.00	23.96	22.71	23.18
Punjab	Sangrur	Kharif	44.22	48.98	54.64	53.72	54.21	53.61
Tamil Nadu	Villupuram	I Season	49.49	50.16	52.22	50.55	52.30	51.54
		II Season	47.56	50.69	49.92	50.58	49.89	50.08
Uttar Pradesh	Lakhimpur Kheri	Kharif	35.25	35.46	35.45	36.00	36.63	35.77
	Badaun	Kharif	34.04	33.75	35.76	36.22	36.81	35.39

Production of Paddy Per Farm

The production of paddy per farm by size groups in different districts is presented in Table 7. It varies very greatly among the districts for each farm size group. This difference is due to the gross cropped area devoted to paddy and its per hectare yield. As seen in the table, production per farm is the highest in East Godavari district, distantly followed by Sangrur and Karnal. At the lower end is the district of Lakhimpur Kheri, followed by Badaun and Rohtas. The district of Balaghat, and Jorhat and Nagaon fall in the middle.

Table 7

Average Production of All Varities of Paddy Per Farm by Size Groups – 2001-02

(In quintals)

State	District	Farm Size group					
		Marginal	Small	Semi-medium	Medium	Large	All
Andhra Pradesh	East Godavari	100.02	182.35	367.98	519.49	1072.69	254.90
Assam	Jorhat & Nagaon	23.41	48.85	83.94	167.62	255.28	85.46
Bihar	Rohtas	23.79	37.82	61.77	136.41	-	51.14
Haryana	Karnal	22.42	50.92	113.48	198.67	542.10	161.67
Madhya Pradesh	Balaghat	16.42	35.00	70.67	115.66	172.50	82.05
Punjab	Sangrur	15.72	55.38	132.60	217.82	511.20	188.97
Uttar Pradesh	Lakhimpur Kheri	8.43	32.80	48.75	72.00	116.00	23.73
	Badaun	16.55	46.82	77.89	107.20	167.50	48.92

Marketed Surplus

The percentage of produce marketed varies very sharply among the selected districts (Table 8). For the sample farmers, it is as high as 98 per cent in Sangrur (Punjab) and Karnal (Haryana), and 92 per cent in Villupuram (Tamil Nadu), but only about 42 per cent in Rohtas (Bihar) and 48 per cent in Lakhimpur Kheri (U.P.). In Badaun district of U.P., it is observed to be 51.0 per cent. On the other hand, the marketed surplus is about 57 per cent for the sample farmers of Assam, 67 per cent for the sample farmers of Andhra Pradesh and 71 per cent for those of Madhya Pradesh. The marketed Surplus of paddy depends, apart from other things, whether or not rice is a staple food of the people of a region and how much production is taking place per farm in a year. It is important to note that marginal farmers in Lakhimpur Kheri district have no marketed surplus at all, while those in Jorhat and Nagaon district

Table 8

Marketed Surplus as Percentage of Paddy Output- 200102

State	District	Farm Size group					
		Marginal	Small	Semi-medium	Medium	Large	All
Assam	Jorhat & Nagaon	4.87	44.67	55.07	64.72	73.55	57.27
Andhra Pradesh	East Godavari	60.59	68.96	64.82	58.98	77.33	67.39
Bihar	Rohtas	18.91	28.42	41.28	63.04	-	42.25
Haryana	Karnal	89.60	93.85	97.06	97.73	98.89	97.74
Madhya Pradesh	Balaghat	50.24	58.68	63.56	70.10	78.88	70.90
Punjab	Sangrur	92.93	97.29	97.61	98.04	98.41	98.02
Tamil Nadu	Villupuram	84.20	89.60	90.20	91.97	94.10	92.40
Uttar Pradesh	Lakhimpur Kheri	-	54.88	61.54	79.17	61.21	48.04
	Badaun	47.19	53.40	54.20	51.12	47.76	50.82

market less 5 per cent of their produce and in Rohtas district market less than 19 per cent only. In general, the percentage of marketed surplus increases with farm size. This is, in fact, quite expected.

Prices Received by Farmers

The average price received by farmers from public and private agencies and the share in marketed surplus of public agencies are presented in Table 9. It is important to note that public agencies intervened in the purchase of paddy in Haryana, Madhya Pradesh. Punjab and Uttar Pradesh only. The farmers in other selected states sold their paddy to private traders and rice millers. The quantity of marketed surplus of paddy purchased by public agencies was less than 15 per cent in Karnal district of Haryana, while it was as high as 97 per cent in Balaghat district of Madhya Pradesh and Sangrur district of Punjab, and 68 per cent in Lakhimpur-Kheri disitrict and 84 per cent in Badaun district of U.P. The minimum support price in 2001-02 was Rs. 530 per quintal for common varieties and Rs. 560 for grade-A varieties. In 2000-01, to which Punjab data pertain, it was Rs. 510 for common varieties and Rs. 540 for grade-A varieties. In Punjab and Haryana, public agencies paid MSP to farmers for the specified varieties. But, even for these varieties, private traders paid much lower price than MSP in Haryana, and for common varieties in Punjab. In Balaghat, the average price received by farmers in peak marketing month of January, when 55 per cent of paddy was sold, was higher than the MSP of common varieties, but substantially lower than that of grade-A varieties. Even this much price seems to be largely due to the intervention of public agencies in the market, as the average price received by farmers of the district was only Rs. 512 per quintal in December and Rs. 498 per quintal in February, when only 2.38 per cent and 4.55 per cent of the marketed surplus was sold. In the case of both the districts of U.P., the prices received by farmers were much lower than the MSP. This was largely due to unfair practices adopted at the procurement centres.

As regards prices paid by private traders/millers in districts where public agencies did not intervene in purchase of paddy, farmers received much lower price than MSP in peak marketing months of Kharif paddy in East Godavari district, but received prices close to MSP for Rabi paddy. This has happened when superior varieties of paddy are cultivated in Kharif

Table 9

Share of Public Agencies in Marketed Surplus of Paddy and PRices Received by Farmers by Varietal Groups in 2001-02

(Rs. per quintal)

State	District	Share of Public agencies	Varietals group	Price received Public agencies	Trader millers	Remarks
Andhra Pradesh	East Godavari	-	-	-	503-580 (Nov. & Feb.) 527*	Sold to local trader
Assam	Jorhat & Nagaon	-	Coarse	-	468	Sold to local trader
			Fine	-	596	Sold to local trader
Bihar	Rohtas	-	-	-	404	Sold to local trader
Haryana	Karnal	14.8% (of common & grade-A varieties)	Common	530	473	Sold in market yards
			Grade-A	560	473	
			Sarwati	-	632	
			Duplicate Basmati	-	908	
			Basmati	-	1172	
Madhya Pradesh	Balaghat	96.7%	-	537**		Sold in market yards
Punjab	Sangrur	96.9%	Common	510	474	Sold in market yards
			Grade-A	540	532	Sold in market yards
Tamil Nadu	Villupuram	-	-	-	704#	Sold in market yards
Uttar Pradesh	Lakhimpur Kheri	67.8%	Grade-A	461@	-	Sold at purchase Centres & market yards
	Badaun	83.8%	Grade-A	453@	-	Sold at purchase Centres & market yards

*Average price paid by processor-cum-wholesaler in 2001-02.
**Price received in the month of January when 55% of the produce was marketed. This price is an average of price paid by both public and private agencies.
#Price received in the month of May when 50% of the produce was marketed.
@Average price received from both public and private agencies.

season. The lower prices for Kharif season paddy could be due higher moisture content in grains. In the case of Jorhat and Nagaon district of Assam, the price received by farmers for coarse varieties was much lower than the MSP of common varieties, but in the case of fine varieties, it was substantially higher than the MSP of grade-A varieties. The average price received by farmers of Villupuram district of Tamil Nadu appears to be quite high. It is likely that the farmer of the district are cultivating superior varieties of paddy. The farmers in Haryana received much higher prices for their superior varieties of paddy than those for common and grade-A varieties.

System of Marketing and Disposal of Paddy

Both the system of marketing and the marketing season differ widely among the selected districts. In the case of Andhra Pradesh, the sample farmers of East Godavari district sold their entire marketed surplus of paddy in the village itself to local traders, who act as sub-

agent of bigger commission agents and rice millers, both of whom operate in tandem and manipulate the market and its prices in their favour. A good section of farmers were also found to be indebted to these traders. The Food Corporation of India purchases rice in bulk as 50 per cent levy on rice millers. As regards the pattern of marketing of paddy by farmers, it was observed that the percentage of marketed surplus of paddy sold during the month of October to March was only 31.7 per cent, while it was 68.3 per cent during April to June. An important reason for this was the substantially higher level of productivity per hectare in Rabi season (77.8 quintals) as compared to Kharif season (40.6 quintals), while area under the crop remained exactly the same in both the seasons, resulting in much higher level of production in Rabi season than Kharif season. The average price of paddy ranged between Rs. 503 per quintal to Rs. 519 per quintal during October to December, which was much lower that the MSP of even common varietal group. Only in January, it reached to the level of Rs. 531 per quintal, which was equal to the MSP of common varieties. The highest level of price of Rs. 580 per quintal was reached in February when less than 6 per cent of the marketed surplus of paddy was sold. During the month of April to June, when more than two-thirds of paddy was marketed, the paddy prices howered around Rs. 560 per quintal, which was equal to the MSP of grade-A varieties. Thus, only for Rabi paddy, the farmers could obtain the price equivalent to MSP of grade-A varieties in East Godavari district.

The farmers of Jorhat and Nagaon districts of Assam sold their entire marketed surplus of paddy to private agencies, either in the village or in weekly markets to middlemen, who take it to town to sell to wholesalers. The selling of produce in weekly markets is a common practice by marginal and small farmers. The fine varieties of paddy are largely cultivated in the selected districts and their marketed surplus was 4.5 times higher than that of coarse varieties. July to November are important months for sale of paddy and together they account for about 69 per cent of the quantity sold. During these months, the prices of fine varieties of paddy ranged between Rs. 570 per quintal and Rs. 600 per quintal in 2001-02. Infact, the average price of fine varieties of paddy remained higher than the MSP of grade-A varieties in all the size groups and in almost all the months. The average price of both fine and coarse varieties of paddy increased with farmer size. This could be either becaues of better bargaining power of large size farmers or because of their selling their produce at a

more appropriate time. The marketing of coarse varieties of paddy was completed during July to September months, while the sale of fine varieties spread throughout the year except the month of May. The examination of average monthly prices received by farmers indicates that the price of fine varieties showed a declining trend from October to December, remained almost constant during December to February, showed a sharp increase during March and April, declined substantially in June, after which showed rising trend till September.

In Rohtas district of Bihar, 70.5 per cent of the total marketed surplus of paddy was sold by sample farmers in the month of November and December only. The average price received in these months was as low as Rs. 392.5 per quintal. The entire quantity of marketed surplus was sold to private traders or millers, either in the village or in local markets. It was observed that the indebtedness of farmers, particularly marginal and small ones, to village traders or commission agents plays an important role in marketing of paddy.

The farmers of Karnal district of Haryana sold their paddy in regulated market yards to traders/millers or to public agencies. Some of the farmers of the state were also indebted to commission agents and therefore received relatively lower price. As regards disposal of the produce, 70.8 per cent of the marketed surplus of all varieties of paddy was sold in the month of October and 26.9 per cent in the month of November. Grade-A varieties accounted for 79.5 per cent of the total marketed surplus of paddy. The prices received by farmers for individual varietal groups of paddy donot show any trend with farm size, except in the case of duplicate Basmati, which shows a declining trend with farm size.

In the case of Sangrur district of Punjab, about 75 per cent of the marketed surplus of paddy was sold in the month of October and 25 per cent in the month of November. The entire produce was sold in regulated market yards. It is reported that some of the farmers were indebted to village traders and commission agents through whom they sell their produce and who pay them relatively lower price and change higher commission, apart from making some unjustified deductions.

The sample farmers of Balaghat district of Madhya Pradesh sold 96.7 per cent of their produce to the representative of the District Central Cooperative Marketing Society in Krishi Upaj Madi (regulated market yard) through open auction system. The Society purchases the produce only from farmers and is supposed to pay the price which is not below the MSP. The

payment is generally made the same day. The month of January was observed to be the peak marketing month of paddy, when about 55 per cent of paddy was sold. The prices received by farmers do not show a definite trend with farm size.

In Villupuram district of Tamil Nadu, the sample farmers sold their paddy prominently in three months: February (21.2 per cent), March (22.7 per cent) and May (50 per cent). The average sale price per bag of 75 Kgs. in these months was Rs. 580.6, Rs. 578.7 and Rs. 528.2, respectively. The varieties of paddy cultivated in the study area were Ponni, IR-20 and ADT-43. All the farmers sold their paddy to private mill owners/traders in regulated market yards. The average price received by farmers shows a declining trend with farm size. This may be related to the quality of produce sold by farmers of different size groups.

The sample farmers of Lakhimpur-Kheri district of U.P. marketed 40.9 per cent of their paddy in the month of November, 38.3 per cent in the month of December and 20.8 per cent in the month of January. The average price per quintal of paddy received by farmers in these months was Rs. 440, Rs. 457 and Rs. 475, respectively. The smaller farmers received relatively lower price than the larger farmers. In Badaun district of U.P., 31.4 per cent of paddy was marketed in November, 37.8 per cent in December and 30.8 per cent in January. The average price per quintal received by farmers in these months was Rs. 428, Rs. 452, and Rs. 474, respectively. The average price of paddy increased substantially with farm size. In both the districts, largely PR varieties were grown.

Concluding Remarks

The growth of rice production in India declined very sharply from 4.3 per cent in eighties to 1.2 per cent in nineties, largely due to very sharp decline in its yield growth rate from 3.7 per cent to 0.9 per cent. Therefore, necessary measures are required to raise the yield of rice substantially.

It is observed that about two-thirds of increase in rice production in recent years has come from the states of eastern region, such as West Bengal, Uttar Pradesh, Bihar & Jharkhand, and Assam. And all these states have shown higher rate of growth in their rice yield than some agriculturally advanced states. Therefore, the potential of increasing rice production in eastern region needs to be exploited through higher investment in infrastructure and greater emphasis on development and dissemination of higher yielding varieties.

The percentage of paddy output marketed is observed to be the lowest in marginal size group of farms in all the selected districts and it generally increases with farm size.

The states where public intervention in the purchase of paddy is high, the farmers are able to receive much better prices for their produce, except in Uttar Pradesh, where procurement centres donotfunction well. Therefore, in order to protect the interest of farmers and to ensure that farmers in all the states receive MSP of paddy to maintain equity, the Central government should ensure that FCI carries out price support operation in all the states in peak marketing season of paddy.

In most of the states, the farmers sell their produce either to village traders or to middlemen. A section of farmers in some of the states are also indebted to these agencies and therefore receive lower prices. Except in Haryana, Punjab and Madhya Pradesh, the farmers didnot sell their paddy in market yards.

As a result of low state intervention in purchase of paddy in Haryana, the farmers received very low prices for their leviable varieties. On the other had, FCI purchases levy rice from millers at a rate derived on the basis of the MSP of paddy. Thus, the benefit of procurement is received by rice millers. Probably, the same thing happens in other states also under similar conditions. Therefore, the FCI should give greaer emphasis on the purchase of paddy from farmers than purchasing rice from millers.

The variations in prices received by farmers in different months arefound to be quite high. The peak marketing months of paddy also differ among the states. Therefore, the procurement operation of public agencies should coincide with these months in different states.

References

Borah, D. (2003), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention - A Study in Assam', Agro-Economic Research Centre for North-East India, Assam Agricultural University, Jorhat, Assam.

Grover, D.K., Vatta, K. and Kumar, S. (2003), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention in Punjab', Agro-Economic Research Centre, Punjab Agricultural University, Ludhiana.

Laksminarayanan, M. (2004), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention in Tamil Nadu', Agro-Economic Research Centre, University of Madras, Chennai.

Mishra, A.M. (2004), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention in Madhya Pradesh', Agro-Economic Research Centre, JNKVV, Jabalpur (M.P.).

Ramgopal, N. (2003), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention in Andhra Pradesh', Agro-Economic Research Centre, Andhra University, Visakhapatnam.

Sharma, Bharti (2003), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention' Agro-Economic Research Centre, University of Allahabad, Allahabad.

Singh, J.P. (2003), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention in Haryana', Agricultural Economics Research Centre, University of Delhi.

Sinha, R.K. (2004), 'Building up of an Efficient Marketing System to Obviate the Need for a Large Scale State Intervention in Bihar', Agro-Economic Research Centre, for Bihar and Jharkhand, T.M. Bhagalpur University, Bhagalpur.

AGRICULTURAL GROWTH IN MAHARASHTRA

By

SRIJIT MISHRA
MANOJ PANDA

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

Agricultural Growth in Maharashtra

Srijit Mishra and Manoj Panda
IGIDR, Mumbai – 400065.

National Seminar on Agricultural Growth in the Post Reform Period

Giri Institute of Development Studies, Lucknow
March 27-29, 2006

Presentation Coverage

- General Economic Scene
- Agriculture growth since reforms
- Cropping pattern changes and regional pattern
- Impact of emerging changes on socio-economic groups
- Implications on Poverty
- Constraints and Prospects

Maharashtra: General Economic Scene

Maharashtra: 9.4% of India's Population, 12.8% of GDP

Per capita Net State Domestic Product (NSDP): second highest among all major states Rs 28848 in 2003-04 (next to Haryana)
Rs 32170 in 2004-05.

Mumbai: commercial and financial capital, contributes 35 per cent of the country's income tax.

Yet, incidence of poverty: 25% compared to 26% all-India 1999-2000

Large intra-state variation: Per capita NDDP in Gadchiroli at
Rs 14000 only 20% of Mumbai's Rs. 70000

Maharashtra Employment Guarantee Scheme (MEGS): much talked about social welfare measure adopted since early 1970s

Tribal pockets: out migration four to six months in a year for jobs. Malnutrition related child deaths are not uncommon,

Large number of farmers' suicides in recent years

Hence, it is interesting to examine agricultural growth performanee to understand the state's development process.

Basic Indicators

Indicators	Maharashtra	India
Population, 2001 (million)	97	1029
Urbanisation Rate, 2001 (%)	42	28
SC/ST, 2001 (%)	19	24
Literacy Rate, 7+, 2001 (%)	77	65
Life Exp, Male, 2001-6 (years)	67	64
Life Exp, Fem, 2001-6 (years)	70	65
Per Capita income (Maha/India) 2004-5	139*	100
Poverty Ratio (HCR), 1999-2000 (%)	25	26
Proportion of area under agriculture (%)	57	46
Proportion of Gross Irrigated Area (%)	16	41
Share of primary sector in SDP/GDP	13	23

*116 excluding Mumbai

Maharashtra: GSDP Growth

Maharashtra has not grown as fast as rest of India after the reforms; economy slowed down with average overall growth 5% p.a. during 1993-002

Agr: Sluggish; negative growth in several years
Manf: Fluctuating, picked up recently
Service: Consistently high

State economy picked up since 2003-04: average GSDP growth of about 8%:

Primary sector: -0.5%,
Secondary and Service sector: 9.5-10%

GSDP Growth Rates by Sectors

	1980-1 to 1992-3	1993-4 to 2003-4	
Maharashtra GSDP	6.75	5.59	
Agriculture	4.48	2.39	
Industry	6.9	3.7	*
Registered Manufacturing	7.4	2.63	*
Electricity, Gas & Water Supply	8.94	3.61	*
Services	7.94	7.77	
Railways	3.71	4.99	*
Other Transport	7.18	5.17	*
Communication	6.57	15.88	*
Banking & Insurance	14.13	8.42	*
Public Administration	3.13	4.14	*

* significant difference

GSDP Structure

Structural shift faster in Maharashtra. Shares in GSDP more like TN

Share of primary sector in GSDP:13% in 2004-05

Secondary sector 33-36% till 98-9, fallen to 26% by 2004-05.

Service sector reached nearly 61% in 2004-05.

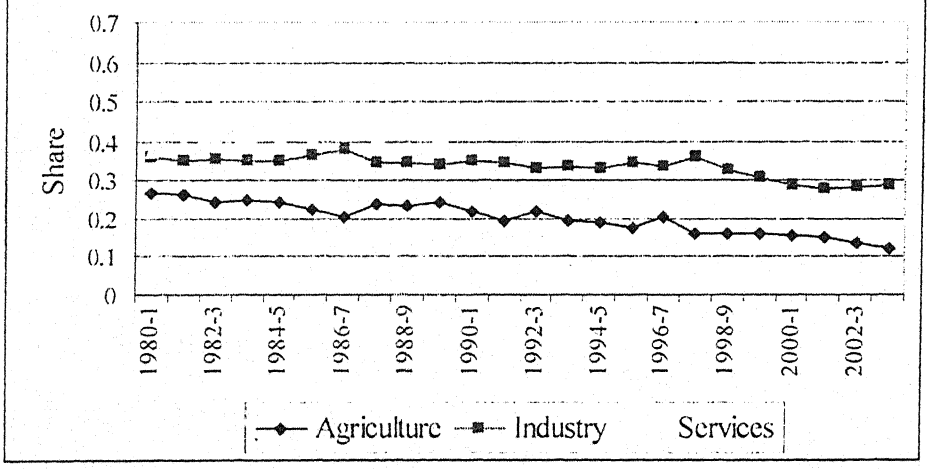
Agriculture still provides more than half of employment: supports 56% of workers

29% cultivators and 27% agrl. labourers

Despite low share of agriculture, proportion of population dependent on agr. falling very slowly, as in rest of India.

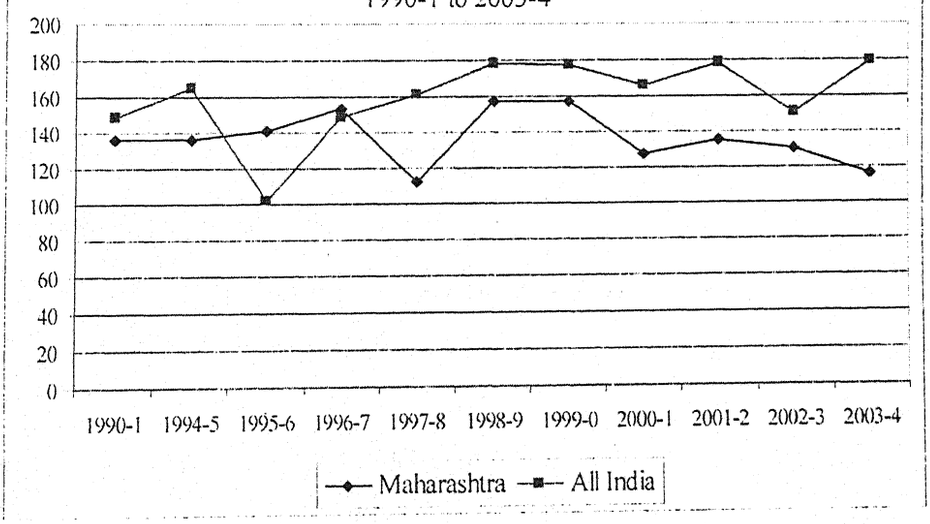
Share in GSDP by Major Sectors

Figure 1
Share of Major Sectors in Maharashtra GSDP,
1980-1 to 2003-4



Index of Agricultural Production

Figure 2
Index of Agricultural Production, Mahrashtra and India,
1990-1 to 2003-4



TE 1981-82=100 for the indices.

Area, Production & Yield in Agr.

	Average Annual Growth Rate TE 1992-3 to TE 2004-5		
	Area	Production	Yield
Cereals	-1.3	-1.1	0.2
Rice	-0.5	0.5	1
Wheat	-0.1	0.8	0.7
Jowar	-1.9	-3.4	-1.4
Pulses	0.5	2	1.3
Oil Seeds	3.7	9	5.1
Sugar Cane	1.2	-1.1	-2.5
Cotton	0.6	7.5	6.9
Fruits	8.4		
Vegetables	7.4		

Decomposition of output into area and yield effects
TE 2002-03 over TE 1992-93 - Share

Crop	Area Effect	Yield Effect	Interaction term	Total Change
Rice	-66.8	-34.6	1.4	-100.0
Wheat	14.9	81.5	3.5	100.0
Jawar	-56.5	-51.2	7.7	-100.0
Total Cereals	-81.0	-21.2	2.2	-100.0
Total Pulses	25.1	69.4	5.5	100.0
Oilseeds	-6.8	109.8	-3.1	100.0
Sugarcane	114.2	-10.6	-3.6	100.0
Cotton	26.1	66.2	7.6	100.0

Cropping Pattern Changes in Maharashtra, 1993-2003

Cropes	Area under different crops in '00 hectares			Incremental Area Over TE1995-96/1998-99	
	TE 1995-96	TE1998-99	TE 2002-03	TE 95-96 to TE98-99	TE 98-99 to TE 02-03
Paddy	6.0	5.7	5.8	-59	-14
Wheat	3.0	3.3	2.9	94	107
Jowar	22.2	19.9	19.3	-493	254
Other Cereals	8.5	9.1	8.5	191	186
Total Cereals	39.7	38.0	36.6	-268	533
pulses	13.4	13.0	13.8	-30	-145
oil seeds	10.6	10.1	9.6	-80	177
Sugar Cane	1.8	2.1	2.2	85	-30
Cotton	10.7	11.9	11.5	365	148
fruits and veg	2.1	2.8	3.8	195	-251
Others	21.7	22.2	22.4	228	41
Total	100.0	100.0	100.0		
Total Area('000 hectares)	25962	26458	25985	496	473

Gross Value of Output Per Hectare in Maharashtra at 1993-94 Prices

(In Thousand Rupees)

Item	TE 1995-96	TE 1998-99	TE 2002-03
Paddy	9.2	8.7	8.1
Wheat	6.6	5.8	6.4
Jowar	2.9	2.9	2.5
Other Cereals	1.5	1.1	1.0
Total Cereals	4.0	4.0	3.7
Total Pulses	4.7	4.7	4.7
Total Oilseeds	7.3	7.8	8.3
Sugar Cane	61.7	57.6	58.9
Cotton	6.8	7.2	6.0
Fruits & Veg.	92.1	75.2	70.8

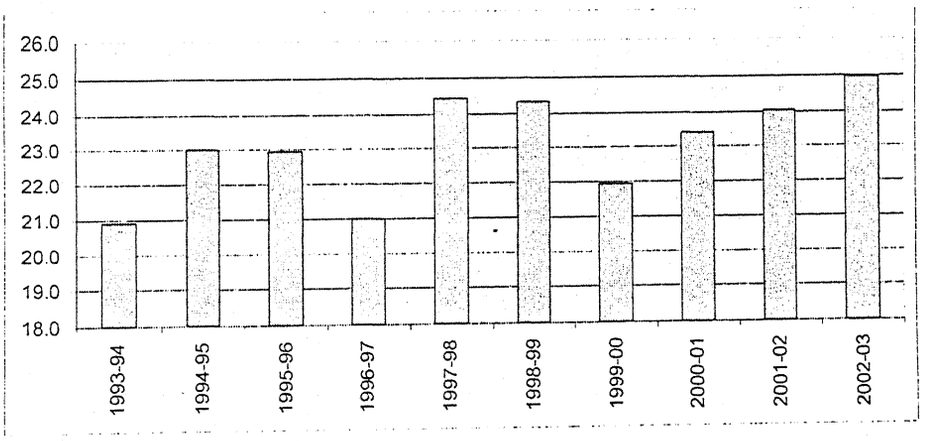
Area and Output from Oilseeds

	Area			Value of Output		
Oilseeds	TE 1995-96	TE 1998-9	TE 2002-03	TE1995-96	TE 1998-99	TE2002-03
Linseed	5.8	4.3	2.6	2.2	1.4	0.8
Sesamum	8.9	5.6	4.9	4.3	2.8	2.3
Groundnut	22.6	20.8	18.0	36.1	33.7	24.4
Safflower	19.2	16.3	11.3	12.8	7.3	5.0
Sunflower	19.3	16.8	12.0	14.4	8.2	6.7
Soyabean	20.4	32.0	46.8	24.7	40.3	55.3
Other Oilseed	3.8	4.2	4.3	5.4	6.3	5.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Area/Value	2750	2670	2493	2005	20796	20588

Total Area in '000 hectares and total value in Rupees crore.

Increase in Soyabean and decline in all others

Percentage Contribution of Livestock Output in Agriculture (including Livestock)

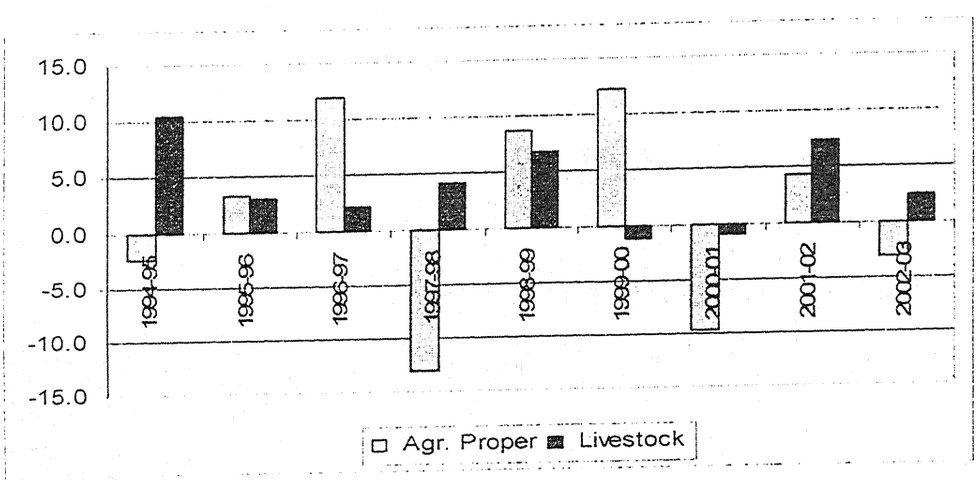


Livestock output : A major source of farmers' income

Contributes 20-25% of value of agricultural output

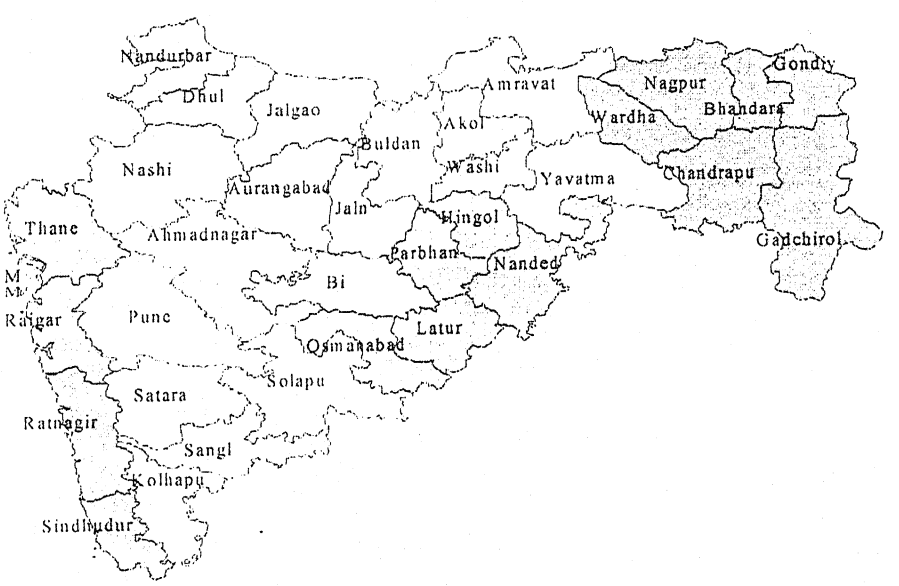
Growth Rate in Value of Output

(1993-94 prices)

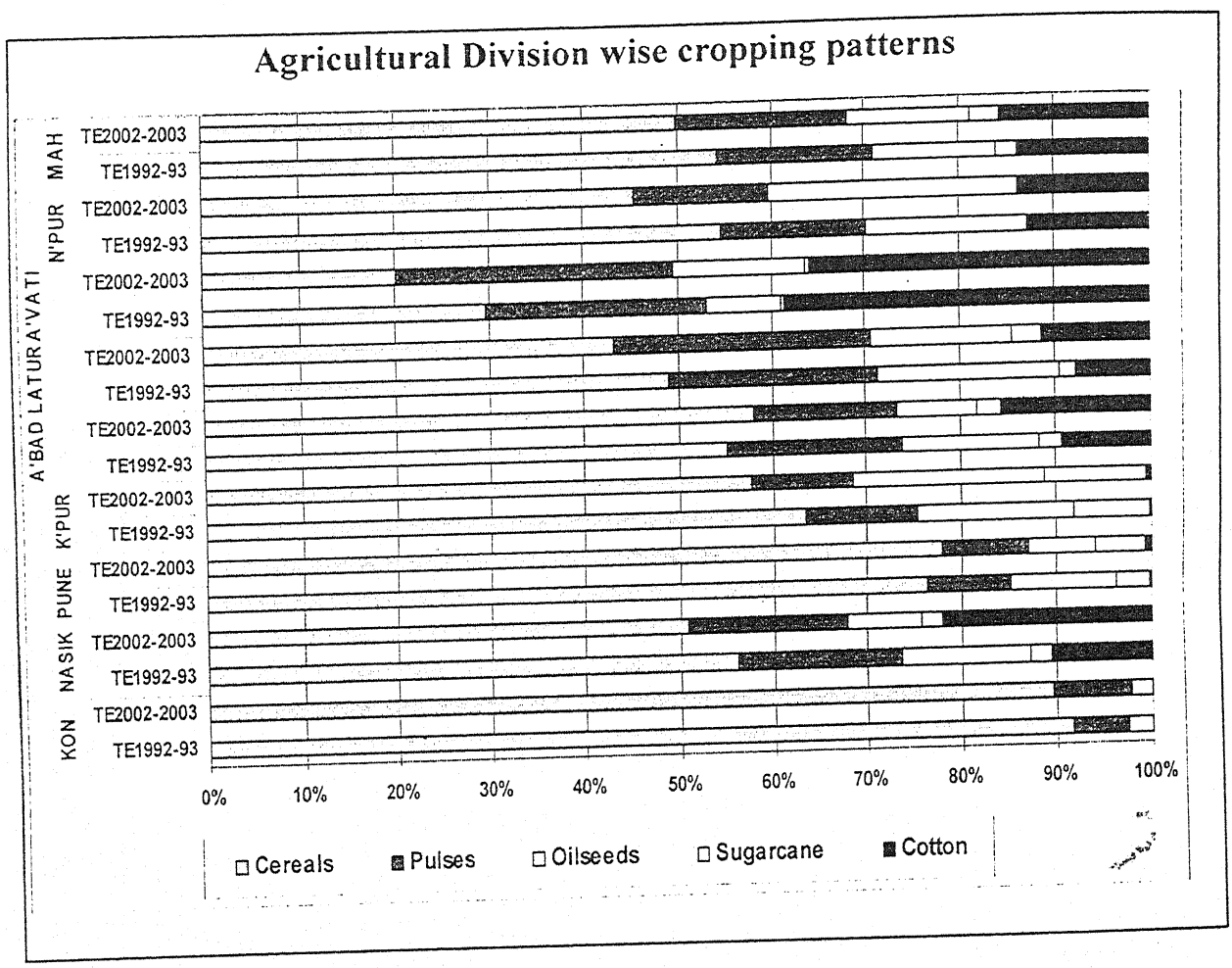


Livestock income more stable source of income compared to agriculture proper (excluding livestock).

Maharashtra: Agricultural Divisions



MS Mumbai
M Mumba


Agricultural Division wise cropping patterns
KON
NASIK
PUNE
K'PUR
A'BAD
LATUR
A'VATI
N'PUR
MAH
TE2002-2003
TE1992-93
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Cereals
Pulses
Oilseeds
Sugarcane
Cotton

Poverty By Social Groups, 1999-2000 (%)

Region	Indicator	ST	SC	OBC	Others	Total
Rural	HCR	44.2	31.6	21.9	12.8	23.2
	Popln Share	16.6	13.0	30.3	40.1	100.0
	Contri. to HCR	31.7	17.7	28.5	22.1	100.0
Urban	HCR	42.8	40.7	33.9	21.1	26.8
	Popln Share	3.1	13.2	18.5	65.2	100.0
	Contri. to HCR	5.0	20.1	23.4	51.5	100.0

Distributional Implications of Cropping Pattern

(NSSO 54th Round data)

	Land	% of Gross Crop Area Under Cultivation			
Caste	Owned (ha.)	Sugar cane	Vege. fruits	All crops	Gross Irrig. area
ST	<2.0	0.0	2.8	3.1	2.3
	>2.0	1.9	7.9	5.8	3.3
SC	<2.0	0.5	0.8	2.9	1.6
	>2.0	3.0	0.3	4.4	3.0
OBC	<2.0	0.8	2.5	4.7	3.7
	>2.0	4.0	18.7	19.5	16.3
Others	<2.0	36.0	24.1	19.7	21.4
	>2.0	53.7	42.9	39.9	48.5
All	<2.0	37.3	30.3	30.4	29.0
	>2.0	62.7	69.8	69.5	71.0
	Total	100.0	100.0	100.0	100.0

Year-wise and Item-wise Share of MEGS Expenditure Across Agricultural Divisions of Maharashtra, 2000-01 to 2003-04 (%)

Year/Item	KOKAN	NASHIK	PUNE	K'PUR	A'BAD	LATUR	AMRAVATI	NAGPUR	MAH
PCGDP	17867a	12769	15887	15286	10770	10378	9215	12212	16479
Year									
2000-01	11.7	16.7	8.0	3.8	16.0	18.4	11.8	13.6	100 (540.8)
2001-02	9.9	15.2	8.9	2.4	22.8	17.1	10.9	12.8	100 (862.7)
2002-03	14.7	8.6	14.5	2.5	23.2	16.9	9.3	10.3	100 (865.1)
2003-04	5.2	5.1	29.2	8.6	18.5	16.4	5.6	11.5	100 (1039.4)
Item #									
Irrigation	0.3	7.7	12.0	5.2	36.8	16.6	6.4	15.0	100 (528.6)
Roads	11.5	14.4	11.7	1.1	25.7	12.3	11.1	12.2	100 (954.8)
Agri.	8.4	6.1	29.6	6.7	14.9	21.8	4.2	8.3	100 (929.9)
Forestry	10.7	13.7	7.0	3.6	10.8	22.3	17.5	14.3	100 (331.1)
Misc.	5.3	19.1	16.6	3.9	17.5	25.6	5.2	6.9	100 (76.9)
Jawahar Wells	7.0	14.4	11.1	9.4	10.6	15.0	15.0	17.3	100 (218.1)
Horticulture	40.9	7.4	14.1	5.7	7.3	8.8	8.8	7.0	100 (211.9)
Establishment	2.6	12.2	13.8	5.4	18.4	18.0	9.4	20.1	100 (86.7)
Total 4 years	10.0	10.6	16.5	4.6	20.5	17.0	9.0	11.9	100 (3338.0)
Total 10 years	10.4	9.8	16.8	4.7	18.9	16.9	9.4	13.1	100 (5223.4)

Note: * Figures in parentheses indicate total. For expenditure under MEGS it excludes certain miscellaneous expenditure at the agg regate level for the state. # Item-wise as well as total expenditure has been combined for four years: 2000-01 to 2003-04. $ Total 10 years data are average for 1994-95 to 2003-04.

a : without mumbai (with mumbai the value is 26170)

Irrigation

Econ. Survey of Maharashtra repeatedly recognises:

- Soil, topography and climate in the state are not so favourable to agr; one-third of state's area falls under rain shadow region.

Gross area irrigated: 16%. No noticeable rise in recent years.

Irrigation potential created: 51 lakh hectares.

Major: 45%, medium: 13%, minor: 42%

Maha. Water and Irri. Committee (1999): Irrigation potential could be raised to 126 lakh hectares.

Huge investment and political will needed to create large irrigation potential in backward regions of Amravati and Nagpur.

Actual utilisation of irrigation potential: 32.5%

Sustainable and efficient management of water key to agrl. dev

More emphasis on sprinkle and drip irrigation, Watershed management, Percolation Tank in EGS

Farmers' Suicides

- Large number of cases of farmers' suicide
- SMR for male farmers in Amravati division is 116 during 2001-4; 10 times higher than the national average (14) for the general population among males.
- Identified risk factors: a combination of systemic and idiosyncratic
- Profitability of cotton, a cash crop of affected districts has been declining. High subsidies by the USA leading to price distortions, low import tariffs in India, and failure of the MCPS to stabilize prices in Maharashtra.
- Withdrawal of state support: declining public investment in agriculture, poor agricultural extension service, diminishing role of formal institutions in rural financial market.
- The farmer now depends on the input dealer for advice leading to supplier-induced demand and on informal sources of credit with greater interest burden.
- Exposed to price as well as yield shocks.

Rural Credit Scenario

- Scheduled Commercial Banks:
  - Credit utilization to agriculture as a proportion of total credit utilization in the state is declining.
  - Agricultural credit utilization is shifting from rural regions to urban areas (particularly, Mumbai).
  - There is also a shift from direct finance to indirect finance within agriculture.
  - Division wise distribution shows decline in the share of both direct and indirect finance components of agricultural credit in Vidarbha.
- Cooperative Credit for Agriculture
  - NSSO 59th – more than half the credit to farmers in Maharashtra is from cooperatives compared to one-fifth for all India. These are outstanding debt, not current loan.
  - Most members is primary agricultural cooperative societies are defaulters with credit lines being chocked for one or many years.
  - Increasing reliance on Informal sector like Moneylenders

POST-REFORM PERFORMANCE OF PUNJAB AGRICULTURE : FROM HIGH GROWTH TO STAGNATION

By

SUCHA SINGH GILL

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Post-Reform Performance of Punjab Agriculture: From High Growth to Stagnation

Sucha Singh Gill*

Punjab agriculture has experienced significant changes after the advent of green revolution since the mid nineteen sixties. With the introduction of green revolution technology consisting of HYV of seeds initially for wheat and later on for rice, network of assured irrigation from canals and tubewells, mechanical inputs such as tractors, pump sets/engines, threshers and chemical inputs like fertilizers, weedicides, pesticides, insecticides etc., production and productivity increased many fold, Punjab emerged as a granary of the country, centre of green revolution and a model of agriculture development for other areas in the country. The increase in agriculture production and productivity was accompanied by transformation of agriculture from traditional to modern in nature. The major part of the production is meant for sale in the market and most of the inputs are also procured from the market. The family labour for agricultural activities used to be the dominant form earlier has been replaced by dominance of hired labour. There has been massive investment by farmers in agricultural machinery and implements supported by large public investment in canal irrigation, rural electrification, network of agricultural research and extension, market infrastructure consisting of market yards, sub yards, godowns for storage of grains; network of credit institutions and rural link roads. The massive public infrastructure support, enterprising nature of the farmers and minimum support price and assured market clearance made green revolution a success story. But green revolution technology began to lose its shine in the mid 1980s and the state has reached a dead end in agriculture development especially during the last few years (2000-01 to 2004-05). This paper is an attempt to examine the change from high growth to stagnation of the agriculture in Punjab. The paper is organized into four sections. Section I analyses transformation of fast growing agriculture into stagnating agriculture. Section II deals with falling rate of returns from agriculture. Section III examines the viability crisis of the small and marginal farmers and farmers who do

* Professor, Department of Economics, Punjabi University, Patiala – 147002.

not like farming. The last section deals with the recent policy initiative to make agriculture of the state dynamic and vibrant.

I

Agricultural growth in Punjab has largely been based on production of foodgrains. The share of area under foodgrain crops stood at 69.2 per cent in 1970-71 which increased to 71.8 per cent in 1980-81 to 75.6 per cent in 1990-91 and 79.0 per cent in 2000-01 and further to 80.0 per cent to 2004-05. Among the foodgrain crops, wheat and rice have occupied the place of prominence. The combined share of these crops stood at 47.4 per cent of the gross cropped area in 1970-71 which increased to 58.1 per cent in 1980-81 to 70.5 per cent in 1990-91 to 76.7 per cent in 2000-01 and 77.3 per cent in 2004-05. Except for cotton crop, the share of all other crops has declined consistently. These crops include sugarcane, oilseeds pulses and other crops. The share of cotton crop in the total cropped area has varied between 5.6 per cent to 10.5 per cent experiencing year to year fluctuations during 1970-71 to 2004-05. The share of area under fruit crops has generally remained less them except per cent except for seven years between 1970-71 and 2004, that too was between 1.0 per cent to 1.2 per cent. Vegetables have gained marginally over years but the area under vegetables in around 1.4 per cent of the gross cropped area (Table 1). Thus agriculture in the state is dominated by wheat and rice crops. The rise to dominance of these two crops was completed in the state by 1990-91, synchronizing with beginning of reform period of India. This is the period when Punjab agriculture began to show signs of fatigue and considerable slow down in growth rate and ultimately moved towards stagnation after 2000-01. The foodgrains production experienced annual trend growth at the rate of 5.69 per cent during 1970-71 to 1980-81. The area under foodgrains grew annually at the rate of 2.44 per cent while the yield grew at the rate of 3.18 per cent during this decade. In the decade of 1980-81 to 1990-91 foodgrains production increased annually at the rate of 4.32 per cent while area under cultivation increased at the rate of 1.36 per cent and yield at the rate of 2.92 per cent. But in the decade (1990-91 to 2000-01) that followed reform period witnessed considerable decline in the growth rate of area as well as that of yield respectively to 0.99 per cent and 1.48 per cent leading to decline in the growth rate of

foodgrains production to 2.48 per cent. During the last four years from 2000-01 to 2004-05 the growth rate of foodgrains production has fallen to insignificant 0.20 per cent. The area has grown at an annual rate of 0.44 per cent while yield has experienced a negative annual growth rate of 0.23 per cent, signifying stagnation in agriculture production. During the two decades (1970-71 to 1990-91) wheat crop had shown significant positive growth in the area, yield and production while rice crop had shown significant and high growth rates in area and production but insignificant growth rate in the yield. In the post reform decade the increase in rice production was contributed by only increase in area at the rate of 2.62 per cent per annum while yield had stagnated with annual insignificant increase in yield at the rate of 0.26 per cent. In case of wheat reverse to this happened as there was an insignificant annual increase in the area at the rate of 0.31 per cent while yield increased at the annual rate of 2.06 per cent and production grew at an annual rate of 2.37 per cent. During the last four year after 2000-01 there has been improvement in yield at an annual rate of 2.80 per cent in rice leading to annual increase in production of this crop at the rate of 3.59 per cent while area has nearly stagnated with annual increase at the rate of 0.77 per cent. The wheat production and per hectare yield declined during this period (2000-01 to 2004-05) respectively at the rate of 1.79 per cent and 2.28 per cent although area under this crop has grown at the annual rate of 0.50 per cent (Table 2). Rice and wheat crops have accounted for 79.8 per cent to 97.8 per cent of the cropped area under foodgrains production during 1970-71 to 2004-05 (Table 5). Stagnation in the area and yield in these troops implies stagnation in foodgrains production. Since these crops dominate the cropping pattern stagnation in these crops means stagnation in agriculture. Other crops such as cotton and sugarcane show fluctuating performance in the area, yield and production have very little capacity to generate dynamism in agriculture of the state (Table 3 and 4). The vegetable and fruits crops are as yet insignificant and account for less than 02 per cent of area under cultivation. There seems to be little capacity of these crops to save the agriculture from stagnation.

The stagnation in the per hectare yields of wheat and rice in the recent (post reform) period signify the exhausted potentials of green revolution technology. On the average Punjab farmers have achieved 75 per cent of realizable potential yield of

rice and wheat. The shrinking difference between yields at experimental farms and average yield at farmers level indicate exhausted potentials of green revolution technology. In terms of available technology Punjab agriculture has achieved satisfactory level in comparison to Indian agriculture (PAU, 1998). The increase in further production could have been possible with further increase in area under cultivation. In terms of net sown area, gross sown area and cropping intensity the state has also reached saturation level. Already 83.4 per cent of the total geographical area is under cultivation. 9.1 per cent area is under non agricultural uses and 6.0 per cent is under forest cover. Of the remaining 1.5 per cent area (agricultural and non cultivable land), there is little scope for increasing area under cultivation. In recent period, the demand on agriculture from growing urbanization has increased leading to decline in net sown area which is declining at the rate of 22,667 hectare per annum during 2001-02 to 2004-05. The cropping intensity which increased very fast from 140.1 in 1970-71 to 188.9 in 2004 is growing at an insignificant rate of 0.33 per cent per year during 2000-01 to 2004-05. There is little possibility for adding to gross cropped area in the state (Table 6 and 7).

II

Stagnating production and productivity has brought down returns from the agriculture to the farmers. It was estimated that there was a decennial trend growth rate of return on wheat at 3.93 per cent during 1980s which turned to -0.35 per cent during 1990-91 to 1997-98 at Cost A1, declined from 2.76 per cent to -6.48 per cent at B2 cost and from 3.55 per cent to -8.27 per cent during same period. In case of rice cultivation the decennial trend growth rate of returns had fallen from 1.90 per cent in 1980s (1980-81 to 1990-91) to -2.83 per cent during 1990-91 to 1997-98 at the Cost A1, from -0.17 to -7.58 at cost B2 and from 1.06 per cent -11.38 per cent at cost C2 during this period (Ghuman, 2002).

The decline in return from agriculture is due to fast increase in cost of production, stagnation/slow down in productivity growth, increase in prices of foodgrains. The cost of production has increased due to sharp increase per acre use of chemical fertilizers, increased capital intensity, decreased use of family labour and increased use of hired labour and other inputs procured from the market. The use of

chemical fertilizers has increased from 92.1 kg per hectare during 1980-83 to 296.7 during 1992-95 and further to 359.36 during 2002-05. The number of tractors per thousand hectare area has increased from 25.4 in 1980-83 to 81.8 in 1987-90 and to 107.1 in 2003. The number of pumps set increased from 157.7 per thousand hectare during 1980-83 to 160.1 during 1992-95 to 271.62 during 2002-05 (Bhalla and Singh, 2001 and EA, 2005). The share of hired labour in wheat was 58.78 per cent during 1981-84 which increased to 69.36 per cent during 1994-97 and in case of rice it decreased from 68.87 per cent to 61.57 per cent but increased in case of cotton from 40.86 per cent 54.43 per cent during this period (Sidhu and Johl, 2002). The growing capital intensity and increased use of chemical inputs has raised costs at higher rates compared to stagnating yields and slow rising prices. In wake of falling water table capital cost has been rising very fast due to replacement of the shallow tubewells with submersible pumps. It is estimated that at 2002-03 prices the value of capital equipment increased from Rs. 10075 crore in 1991-92 to Rs. 14410 crore in 2003. The per hectare value of machinery has increased from Rs. 23902.35 to Rs. 34114.58 during period, recording a rise of 42.72 per cent (Singh and Sidhu, 2005). The over capitalization in terms of number of tractors (4,50,552 in 2003) and tubewells (11.68 lakh in 2005) are considerably under utilized. The average utilization of a tractor is estimated at 20 per cent of the capacity while that of a diesel engine is 22 per cent. On small farms average utilization of tractor is as low as 04 per cent compared to 16 per cent on medium forms (Sain, et. al., 1999). The over capitalization by farmers in agriculture is accompanied by very low public investment. Leaving the exceptional year of 1985-86 in all other years between 1980-81 to 2000-01, the share of public investment as percentage of net state domestic product of agriculture has remained between 0.25 per cent and 8.45 per cent. The major share of it has been used for revenue account budget. For five years out of 21 years data presented in table 8, the capital account investment was negative and for four years less than one per cent of NSDP in agriculture. Only for seven years capital account investment was more than 2 per cent of the NSDP in agriculture. Though the state has been providing huge subsidy to agriculture for free supply of electricity (more than Rs. 1400 crore in 2004-05) and canal water for irrigation since 1998 yet the public investment continues to be meager in agricultural research and development and also in agricultural marketing

infrastructure. This has led to stagnating yields of wheat and paddy and development of monocrop culture in the state.

III

The falling returns from agriculture and rising cost of production are accompanied by changing pattern of cultivation. Machine power has almost replaced the bullock power. As has been brought out (Table 9) that 2.5 per cent of the farmers in Punjab plough their farms with animal power, the remaining 97.5 per cent use diesel (tractors) and electricity for ploughing purposes. In irrigation electricity and diesel power is used and bullock power is completely ousted. The same is the story in harvesting and threshing of the crops. Only in came crushing and transport animal power has a marginal role respectively 5.3 per cent and 3.5 per cent. In a highly mechanized agriculture a farmer either is supposed to own costly equipment or depend on custom hiring. This makes marginal and small holdings unviable. In case of ownership of machinery, there is heavy underutilization of it adding to overhead charges and heavy maintenance expenditure. In case of custom hiring, timely availability of the equipment in busy seasons becomes a problem. Moreover, custom hiring is a sellers market where poor buyer is forced to pay very high rate adding heavily to the cost of cultivation. The crisis of small and marginal farmers is very serious from other counts also. They also heavily depend on hired labour and themselves remain unemployed for most of the time except in the busy season. Under present crop technology one hectare of wheat-paddy cultivation generates around Rs. 33000 return over variable cost which is not enough for their dignified living. In case of small farmers the income level will double to Rs. 66,000 (Singh and Dhaliwal, 2002). The proportion of small and marginal holdings has become very high in the state. The number of small and marginal holdings in the state is overwhelming. Out of 18,44,200 holdings estimated by NSSO in 2003, majority of them belong to marginal and small farmers. The proportion of such holdings has grown over period of time. The proportion of marginal holdings stood at 11.71 per cent in 1970-71 which increased to 59.02 per cent in 1980-81 and 63.22 per cent in 1991-92 but declined slightly to 62.00 per cent in 2003. The proportion of small holdings declined from 19.06 per cent in 1970-71 to 10.39 per cent in 1981-82 but increased to 11.92

per cent in 1991-92 and 13.66 per cent in 2003. The proportion of other categories such as semi-medium, medium and large declined between 1970-71 to 1991-92 but stabilized between 1991-92 to 2003 (Table 10). The post reform period has strengthened their position while small and marginal farmers are facing a viability crisis. A large number among them are under pressure to seek safe exit from agriculture. It has been brought out by NSSO, 59th round that 36.9 per cent farmers in Punjab do not like farming and 60.8 per cent like farming compared to 40.1 per cent not liking farming and 59.4 per cent linking farming in India. Among the farmers who do not like farming, 73.71 per cent reported in Punjab that it was not profitable compared to 66.08 per cent farmers reporting not profitable farming at all India level. This is followed by 6.23 per cent in Punjab and 20.70 per cent in India giving risky nature of farming as a reason for not liking it. The lack of social status is reported by 4.34 per cent in Punjab compared to 4.74 per cent at all India level as reason for not liking farming (Table 11). Though size class break up of such farmers is not available yet it is reasonable to believe that majority of farmers reporting farming not profitable belong to category of small and marginal groups. The position of small and marginal farmers has been made more precarious by fast declining ground water level due to present cropping pattern and farm practices in the state. This is forcing all farmers to deepen tubewell bores involving lot of expenditure which is many cases in beyond the resources of the marginal and small farmers. It is estimated that 02 lakh centrifugal tubewells will have to be replaced by submersible pumps during next 10 years involving investment of Rs. 2000 crore (Sidhu and Johl, 2002). Besides, over exploitation of land due to intensive cultivation, micro nutrients in the soil are reduced leading to reduction in soil fertility. This has necessitated higher use of chemical fertilizers to attain the same level of yield per hectare. At the same time, the present cropping pattern and crop varieties have brought invasion of several pests, insects, diseases and weeds which require increased use of pesticides, insecticides and weedicides. These environmental changes have put a question mark on the sustainability of agriculture. These changes hurt more to the resource poor farmers. The prevalence of reverse tenancy has already crowded out the marginal and small farmers from the land lease market. The viability crisis of resource poor farmers is

likely to push many of them out of agriculture but they are remaining trapped in it for want of alternative opportunities for those who want to leave agriculture.

IV

In wake of slowdown in growth in agricultural productivity in the mid 1980s, Government of Punjab appointed on Expert Committee which submitted its report in May 1986. The committee suggested diversification of agriculture as a solution to exhausting potentials of green revolution. The Committee suggested that 20 per cent of the area under wheat-paddy rotation be sifted to vegetable, pulses, fruit crops, agro forestry and dairying activities (Report of the Expert Committee, 1986). The recommendations of this committee got a lot of attention within and outside the government in the state but they remained largely unimplemented. Punjab Government again appointed Chief Minister's Advisory Committee on Agriculture Policy and Restructuring which submitted its report in October 2002 (Chief Minister's Advisory Committee Report, 2002). The Committee suggested that 10 lakh hectares (23.4 per cent of net sown area) of land under wheat-paddy rotation be replaced by other crops which consume less water, are compatible ecologically and are in demand in the country. For this purpose crop adjustment programme was submitted to the Union Government for financing and providing Rs. 1280 crore to the state government for this purpose. This was not accepted by the Union Government. Subsequently, Government of Punjab launched a programme of crop diversification in February 2003. Starting with proposal of 4 lakh acres to be shifted away from wheat and paddy during 2003 it was planned to bring 09 lakh acres upto 2004, 13 lakh acres up to 2005, 18 lakh acres upto 2006 and finally 25 lakh acres (10 lakh hectares) under crop diversification programme. The new crops which were expected to replace wheat and paddy over this area included hyola, barley, winter maize, durum wheat, sunflower, spring corn, basmati rice, kharif corn, guar gum, castor/jastropha, groundnut, organic basmati, vegetables and others. For implementation of this programme Punjab Agro foodgrains Corporation (PAFC) was established. PAFC has attempted to carry out this plan through contract farming. The contract farming in the state was implemented through involvement of private companies such as Mahindra Shubh Labh, Tata Rallis, Kargil, Pepsi Foods Limited, Advanta India Limited,

Proagro Seed Company Limited, Sygenta Ltd., etc. These companies were to provide high quality seeds, provide extension services to the counteracting farmers and buy back the produce from the farmers at pre agreed prices. This programme was implemented through offices of Deputy Commissioners of various districts in the state and the Agriculture Department of the government as well as Punjab Agriculture University was not involved in identification of the contracting farmers, credibility capability of the contracting companies and provisioning of agricultural extension services. This progamme faltered from the very beginning. A study (Dhaliwal et. al. 2004) pertaining to the first year of implementation (2003) brought out serious problems in the working of this programme especially to the disadvantage of the contracting farmers.

In the subsequent year (2004-05) the area under wheat and paddy increased and it is expected to increase in the current year (Economic Advisor, 2006). The programme has neither provided the farmers viable crops with stable yields and income alternative to wheat and paddy nor ensured higher income from the new crops. At the same time there is no effective mechanism in the state to regulate the working of companies to avoid fraudulent practices of the companies with respect to the quality of seeds, procurement of the contracted crop and payment of remunerative prices and timely payments to the farmers. Similarly when it suited the farmers they also did not supply the requisite quantity of the contracted crops. As a result the agriculture of the state continues to be dominated by wheat and paddy with stagnating yields and falling income. Except for the introduction of Bt Cotton seeds, there is no other innovation worth mentioning in the seed technology which has been accepted by the farmers. The innovations in the farming practices or on organizational front are much desired to put Punjab agriculture on the dynamic path but they are not visible as yet. Neither farmers' organization nor the Punjab Government has taken any other initiative for encouraging genuine co-operatives of the farmers. There is no attempt to involve farmers collectively in marketing and processing of the agricultural produce. There is also no plan/programme within the state to accommodate unviable farmers in non farm employment.

Table 1

Share of Selected Crops/Crop Categories in Total Cropped Area (Percentage)

Year	Wheat	Rice	Cotton	Sugar-cane	Oil Seeds	Pulses	Fruits	Vege-tables	Others	Total
1970-71	40.5	6.9	7.0	2.3	5.2	7.3	0.6	0.9	29.3	100
1975-76	39.0	9.1	9.3	1.8	5.0	7.1	0.6	1.2	26.9	100
1980-81	41.6	17.5	9.6	1.0	3.5	5.0	0.4	1.1	20.3	100
1981-82	42.0	18.3	9.9	1.5	3.2	4.6	0.4	1.0	19.1	100
1982-83	44.1	19.1	10.5	1.5	2.7	3.0	0.5	0.9	17.7	100
1983-84	45.2	21.4	9.4	1.2	2.3	2.9	0.5	0.9	16.2	100
1984-85	44.1	23.4	6.7	1.1	2.8	2.9	0.6	1.0	17.4	100
1985-86	43.5	23.9	7.8	1.1	2.9	3.1	0.7	1.1	15.9	100
1986-87	44.1	24.7	7.9	1.3	2.2	3.2	0.7	0.7	15.2	100
1987-88	42.7	23.5	8.5	1.4	3.1	2.1	0.8	0.9	17.0	100
1988-89	42.8	24.1	10.4	1.3	2.1	2.2	0.8	0.9	15.4	100
1989-90	43.9	25.8	9.9	1.4	1.6	1.8	0.9	0.8	13.9	100
1990-91	43.6	26.9	9.3	1.3	1.4	1.9	0.9	0.7	14.0	100
1991-92	43.1	27.5	9.6	1.4	2.8	1.2	0.9	0.8	12.7	100
1992-93	43.5	27.4	9.3	1.5	2.6	1.3	1.0	0.7	12.7	100
1993-94	43.7	28.6	7.6	1.0	2.0	1.4	1.0	0.7	14.0	100
1994-95	43.0	29.4	7.8	1.0	2.0	1.4	1.0	0.8	13.6	100
1995-96	43.8	28.3	9.6	1.8	3.1	1.4	1.1	1.0	10.1	100
1996-97	41.8	27.6	9.2	2.2	3.1	1.2	1.1	1.0	12.8	100
1997-98	41.9	28.9	9.2	1.6	1.8	1.1	1.1	1.1	11.3	100
1998-99	42.4	32.5	7.3	1.3	2.1	0.9	1.2	1.5	10.8	100
1999-00	43.1	33.2	6.1	1.4	1.2	0.8	0.4	1.6	12.5	100
2000-01	43.4	33.3	6.0	1.5	1.1	0.7	0.4	1.4	12.2	100
2001-02	43.1	31.3	7.6	1.8	1.0	0.6	0.5	1.3	12.8	100
2002-03	43.1	32.3	5.6	2.0	1.3	0.5	0.5	1.4	13.3	100
2003-04	43.6	33.1	5.7	1.6	1.1	0.6	0.6	1.4	12.3	100
2004-05	43.9	33.4	6.4	1.1	1.1	0.5	0.6	1.4	11.6	100

Sources: Various Issues of **Statistical Abstract of Punjab**, an annual publication of Economic and Statistical Organization, Government of Punjab, Chandigarh.

Table 2
Annual Growth Rates of Rice, Wheat, Sugarcane, Cotton and Total Food grain

	Rice			Wheat			Sugarcane			Cotton			Total Food grains		
Year	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
1970-71 to 1980-81	12.56*	17.82*	4.66*	2.34*	4.66*	2.27*	-3.51	-0.51	3.09*	4.24*	2.89*	-1.30	2.44*	5.69*	3.18*
1980-81 to 1990-91	5.19*	6.43*	1.18	1.21*	4.17*	2.92*	2.01	2.40	0.37	0.83	8.47*	7.58	1.36*	4.32*	2.92*
1990-91 to 2000-01	2.62*	2.90*	0.26	0.31	2.37*	2.06*	2.33	2.20	0.04	-3.24	-9.69*	-6.67	0.99*	2.48*	1.48*
2000-01 to 2004-05	0.77	3.59	2.80	0.50	-1.79	-2.28	-7.93	-10.86	-3.18	-1.50	13.13	14.85	0.44	0.20	-0.23
1970-71 to 2004-05	5.59*	7.31*	1.63*	1.22*	3.52*	2.28*	0.46	1.21*	0.78*	0.13	0.91	0.78	1.44*	3.95*	2.48*

*significant at one per cent
A = Area
P = Production
Y = Yield pr hectare

Table 3
Area, Production and Yield of Rice, Wheat and Sugarcane

Year	Rice			Wheat			Sugarcane		
	A	P	Y	A	P	Y	A	P	Y
1970-71	390	688	1765	2299	5145	2238	128	527	4117
1971-72	450	920	2045	2336	5618	2406	103	403	3912
1972-73	476	955	2007	2404	5368	2233	102	469	4602
1973-74	499	1140	2287	2338	5181	2216	110	582	5289
1974-75	569	1179	2071	2207	5286	2395	123	615	4997
1975-76	567	1447	2553	2439	5788	2373	114	613	5374
1976-77	680	1776	2611	2630	6392	2430	113	607	5371
1977-78	858	2497	2910	2617	6642	2538	115	652	5612
1978-79	1052	3090	2937	2739	7439	2716	108	612	5668
1979-80	1172	3052	2604	2813	7868	2797	77	393	5099
1980-81	1183	3233	2733	2812	7677	2730	71	392	5521
1981-82	1269	3750	2955	2914	8544	2932	104	601	5779
1982-83	1322	4156	3144	3052	9168	3004	104	634	6098
1983-84	1481	4536	3063	3124	9422	3015	84	553	6580
1984-85	1644	5052	3073	3094	10176	3289	79	492	6230
1985-86	1714	5485	3200	3112	10988	3531	78	504	6473
1986-87	1786	5949	3331	3185	9447	2966	97	611	6300
1987-88	1720	5442	3164	3131	11084	3540	106	582	5487
1988-89	1778	4925	2770	3158	11580	3667	97	600	6186
1989-90	1908	6697	3510	3247	11666	3593	103	650	6312
1990-91	2015	6506	3229	3273	12159	3715	101	601	5941
1991-92	2069	6739	3257	3237	12309	3803	109	693	6348
1992-93	2072	7026	3391	3283	12399	3770	112	688	6141
1993-94	2179	7645	3507	3335	13378	4011	77	468	6121
1994-95	2265	7662	3381	3311	13542	4089	80	495	6219
1995-96	2185	6843	3132	3221	12510	3884	136	888	6529
1996-97	2159	7334	3397	3232	13687	4235	174	1027	5905
1997-98	2278	7890	3465	3301	12751	3853	136	716	5685
1998-99	2518	7993	3152	3278	14192	4332	103	608	5952
1999-2000	2604	8716	3347	3388	15910	4696	108	676	6265
2000-01	2612	9157	3506	3408	15551	4563	121	777	6425
2001-02	2487	8816	3545	3420	15499	4532	142	925	6512
2002-03	2530	8880	3510	3375	14175	4200	154	908	5894
2003-04	2614	9656	3694	3444	14489	4207	123	662	5382
2004-05	2647	10437	3943	3481	14695	4221	86	517	6012

A-Area (thousand hectares)
P-Production (thousand metric tones)
Y-Yield (per hectare in kg)
Sources: Various Issues of **Statistical Abstract of Punjab**, an annual publication of Economic and Statistical Organization, Government of Punjab, Chandigarh.

Table 4
Area, Production and Yield of Cotton and Total Food Grains

Year	Cotton			Total Food Grains		
	A	P	Y	A	P	Y
1970-71	397	818	2060	3928	7305	1859
1971-72	475	1030	2168	3915	7925	2024
1972-73	506	1077	2128	4015	7692	1916
1973-74	523	1158	2214	4099	7679	1873
1974-75	547	1200	2194	3957	7945	2008
1975-76	580	1235	2129	4332	8827	2038
1976-77	555	1136	2047	4461	9338	2093
1977-78	609	1231	2021	4478	10357	2313
1978-79	631	1318	2089	4756	11676	2455
1979-80	630	1207	1916	4762	11906	2500
1980-81	649	1178	1815	4854	11921	2456
1981-82	686	1275	1859	4999	13318	2664
1982-83	724	1218	1682	5016	14173	2826
1983-84	650	707	1088	5206	14785	2839
1984-85	472	1241	2629	5355	16098	3006
1985-86	559	1403	2509	5394	17226	3194
1986-87	567	1691	2982	5527	16215	2934
1987-88	621	1863	3000	5296	17092	3227
1988-89	765	2118	2769	5415	17063	3151
1989-90	733	2459	3355	5545	18961	3419
1990-91	701	1909	2723	5668	19218	3390
1991-92	719	2505	3484	5638	19632	3482
1992-93	702	2353	3352	5696	20056	3521
1993-94	577	1516	2627	5856	21575	3684
1994-95	598	1763	2948	5896	21761	3690
1995-96	742	1928	2598	5797	21663	3738
1996-97	716	1868	2609	5697	21565	3785
1997-98	724	936	1292	5875	21139	3598
1998-99	563	596	1058	6060	22691	3744
1999-2000	477	953	1998	6252	25197	4030
2000-01	474	1199	2529	6277	25322	4034
2001-02	606	1305	2153	6152	24878	4044
2002-03	450	1085	2411	6132	23489	3831
2003-04	452	1478	3269	6287	24724	3933
2004-05	509	2088	4102	6347	25662	4043

A-Area (thousand hectares)
P-Production (thousand metric tones)
Y-Yield (per hectare in kg).
Sources: Various Issues of **Statistical Abstract of Punjab**, an annual publication of Economic and Statistical Organization, Government of Punjab, Chandigarh.

Table 5
Rice, Wheat and Total Foodgrains Production in Punjab

(000 tonnes)

Year	Rice	Wheat	Total Rice+Wheat	Total Foodgrains	Share of wheat and Rice in %
1970-71	688	5145	5833	7305	79.8
1971-72	920	5618	6538	7905	82.7
1972-73	955	5368	6323	7692	82.2
1973-74	1140	5181	6321	7679	82.3
1974-75	1179	5286	6465	7945	81.4
1975-76	1447	5288	6735	8827	82.0
1976-77	1776	6392	8168	9338	87.5
1977-78	2497	6642	9139	10357	88.2
1978-79	3090	7439	10529	11676	90.2
1979-80	3052	7868	10920	11906	91.7
1980-81	3233	7677	10910	11921	91.5
1981-82	3750	8544	12294	13318	92.3
1982-83	4156	9168	13324	14173	94.0
1983-84	4536	9422	13958	14785	94.4
1984-85	5052	10176	15228	16098	94.6
1985-86	5485	10988	16473	17226	95.6
1986-87	5949	9447	15396	16215	94.9
1987-88	5442	11084	16526	17092	96.7
1988-89	4925	11580	16505	17063	96.7
1989-90	6697	11666	18363	18961	96.8
1990-91	6506	12159	18665	19218	97.1
1991-92	6739	12309	19048	19632	97.0
1992-93	7026	12399	19425	20056	96.9
1993-94	7645	13378	21023	21575	97.4
1994-95	7662	13542	21204	21761	97.4
1995-96	6843	12510	19353	21663	89.3
1996-97	7334	13687	21021	21565	97.5
1997-98	7890	12751	20641	21139	97.6
1998-99	7993	14192	22185	22691	97.8
1999-2000	8716	15910	24626	25197	97.7
2000-01	9157	15551	24708	25322	97.6
2001-02	8816	15499	24315	24878	97.7
2002-03	8880	14175	23055	23489	98.2
2003-04	9656	14489	24145	24724	97.7
2004-05	10437	14695	25132	25662	97.9

Sources: Various Issues of **Statistical Abstract of Punjab**, an annual publication of Economic and Statistical Organization, Government of Punjab, Chandigarh.

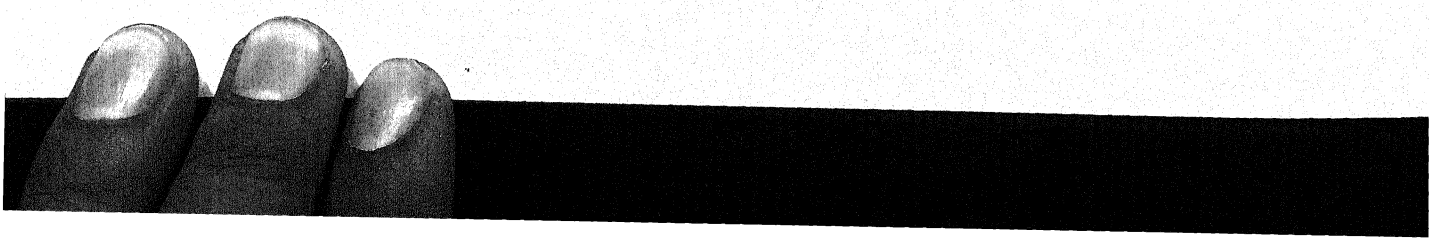


Table 6

Annual Growth Rates of Net Sown Area, Gross Sown Area and Cropping Intensity

Year	Net Sown Area	Gross Sown Area	Cropping Intensity
1970-71 to 2004-05	0.08*	0.99*	0.90*
1970-71 to 1980-81	0.35*	1.76*	1.40*
1980-81 to 1990-91	-0.01	1.02*	1.03*
1990-91 to 2000-01	0.10	0.55*	0.45*
2000-01 to 2004-05	-0.39	0.33	0.33

* significant at one per cent.

Table 7
Net Sown Area, Gross Sown Area and Cropping Intensity

Years	Net Sown Area	Gross Sown Area	Cropping Intensity
1970-71	4053	5678	140.1
1971-72	4076	5724	140.4
1972-73	4086	5931	145.2
1973-74	4114	6037	146.7
1974-75	4092	5902	144.2
1975-76	4158	6255	150.4
1976-77	4167	6285	150.8
1977-78	4171	6390	153.2
1978-79	4177	6630	158.7
1979-80	4182	6535	156.3
1980-81	4191	6763	161.4
1981-82	4210	6929	164.6
1982-83	4202	6915	164.6
1983-84	4212	6917	164.2
1984-85	4189	7013	167.4
1985-86	4197	7158	170.6
1986-87	4202	7217	171.8
1987-88	4151	7326	176.5
1988-89	4205	7387	175.7
1989-90	4193	7393	176.3
1990-91	4218	7502	177.9
1991-92	4215	7518	178.4
1992-93	4139	7552	182.5
1993-94	4214	7623	180.9
1994-95	4202	7669	182.5
1995-96	4136	7712	186.5
1996-97	4234	7818	184.6
1997-98	4239	7833	184.8
1998-99	4173	7740	185.5
1999-00	4243	7847	184.9
2000-01	4250	7941	186.8
2001-02	4268	7941	186.1
2002-03	4224	7826	185.3
2003-04	4201	7905	188.2
2004-05	4200	7932	188.9

Sources: Various Issues of **Statistical Abstract of Punjab**, an annual publication of Economic and Statistical Organization, Government of Punjab, Chandigarh

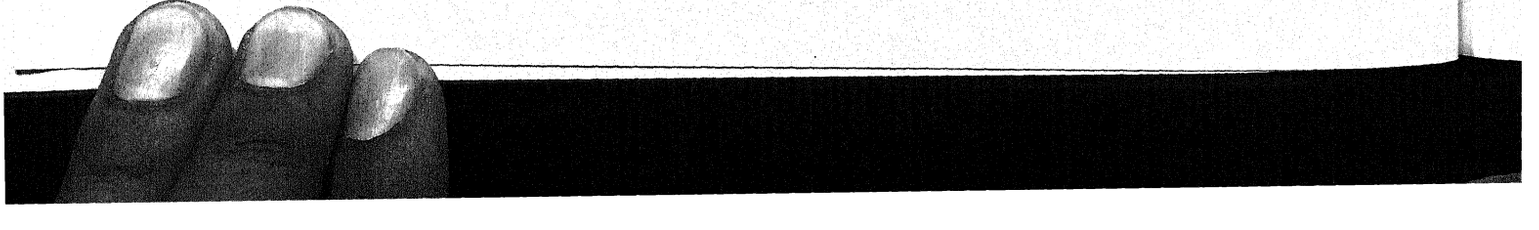


Table 8
Public Investment in Punjab Agriculture
(Rs. Crores at 1980-81 prices)

Year	Revenue Acc.	Capital Acc.	Total
1980-81	54	-15	39
	(2.51)	(-0.70)	(1.81)
1981-82	56	-04	52
	(2.46)	(-0.18)	(2.28)
1982-83	57	-19	38
	(2.37)	(-0.79)	(1.58)
1983-84	78	13	91
	(3.18)	(0.53)	(3.71)
1984-85	84	28	112
	(3.12)	(1.04)	(4.16)
1985-86	115	176	291
	(4.00)	(6.12)	(10.12)
1986-87	119	-54	65
	(3.95)	(-1.79)	(2.16)
1987-88	223	65	288
	(6.54)	(1.91)	(8.45)
1988-89	152	95	247
	(4.17)	(2.61)	(6.78)
1989-90	158	28	185
	(3.78)	(0.68)	(4.76)
1990-91	159	74	233
	(3.75)	(1.74)	(5.49)
1991-92	172	24	296
	(3.50)	(0.49)	(3.99)
1992-93	178	55	233
	(3.57)	(1.10)	(4.67)
1993-94	172	162	334
	(2.91)	(2.75)	(5.66)
1994-95	112	252	364
	(1.81)	(4.08)	(5.89)
1995-96	178	85	263
	(2.97)	(1.42)	(4.39)
1996-97	156	-140	16
	(2.44)	(-2.19)	(0.25)
1997-98	182	221	403
	(2.86)	(3.48)	(6.34)
1998-99	206	186	392
	(3.20)	(2.88)	(6.08)
1999-00	186	61	247
	(2.74)	(0.90)	(3.64)
2000-01	216	322	537
	(3.08)	(4.60)	(4.68)

Source: Calculated from Joginder Singh and R.S. Sidhu "Investment in Punjab Agriculture: Micro and Macro Level Evidence", a paper presented at CRRID-ISAE-IFIRI, during 9-10 April, 2005, Chandigarh.

Note : Figures in brackets are percentage of NSDP in agriculture.

Table 9
Per Thousand Distribution of Farmers by Primary Source of Energy in Punjab

Activity	Electricity	Diesel/Petrol/Kerosene	Animal Power	Total
Ploughing	15	961	25	1000
Irrigation	710	290	0	1000
Harvesting	40	960	0	1000
Threshing	57	943	0	1000
Cane Crushing	104	843	53	1000
Transport	15	950	35	1000

Source : NSSO, 59th Round, *Some Aspects of Farming.*

Table 10

Changes in Percentage Distribution of Operational Holdings and Area Operated by Different Size Classes in Punjab

Size Class (in hectares)	1970-71		1981-82		1991-92		200	
	Number	Area	Number	Area	Number	Area	Number	Area
Marginal (0-1)	11.71	1.46	59.02	3.91	63.22	6.20	62.00	6.52
Small (1-2)	19.06	7.09	10.39	8.90	11.92	10.74	13.66	14.06
Semi-medium (2-4)	32.70	24.80	13.96	21.76	13.85	26.92	13.40	26.19
Medium (4-10)	30.51	45.05	14.15	45.85	9.82	40.55	9.23	38.75
Large (10 and above)	6.02	22.12	2.48	19.58	1.69	15.79	1.70	14.55
All size classes	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source : NSSO 26th, 39th, 48th and 59th rounds.

Table 11
Percentage of Farmers not liking Farming and Reasons

Sr. No.	Reasons	Punjab	India
1.	Not profitable	73.71	66.08
2.	Lack of Social Status	4.34	4.74
3.	Risky	6.23	20.70
4.	Others	15.45	8.23
	Total	100.00 (36.9)	100.00 (40.0)

Source : NSSO 59th round.

Note : Figures in brackets are percentage of total farmers not liking farming.

Bibliography :

1. Bhalla, G.S. and Singh, Gurmail (2001) *Indian Agriculture : Four Decades of Development*, Sage Publications, New Delhi.
2. Chief Minister's Advisory Committee (2002), *Agricultural Production Pattern Adjustment Programme in Punjab for Productivity and Growth*, Government of Punjab, Chandigarh.
3. Dhaliwal, H.S., Kaur, Manjeet and Singh, Joginder (2004), *Evaluation of Contract Farming in the Punjab State*, Mimeo, Department of Economics, PAU, Ludhiana.
4. Ghuman, RS., "World Trade Organization and Indian Agriculture With Special Reference to Punjab", in S.S. Johal and S.K. Ray (Eds.), *Future of Punjab Agriculture,* CRRID, Chandigarh.
5. Economic Advisor (2006), *Economic Survey of Punjab*, Government of Punjab, Chandigarh.
6. Report of the Expert Committee *on Diversification of Agriculture in Punjab* (1986), Govt. of Punjab, Chandigarh.
7. PAU (1998), *Proceedings of Brain Storming meeting on Farmers and Farming in Punjab*, Ludhiana.
8. Sain, Inder, Joshi, A.S., Singh, Amarjeet and Sharma, V.K. (1999), *A Study into the Economics of Forming and Pattern of Income and Expenditure Distribution in Punjab Agriculture, 1997-98*, Research Project Report, Department of Economics, PAU, Ludhiana.
9. Singh, Joginder and Sidhu, R.S. (2005), "Investment and Growth in Punjab Agriculture: Micro and Macro Level Evidence", a paper presented at CRRID-ISAE-IFPRI Seminar on *Rationalizing Investment and Subsidies in Indian Agriculture* held during April 9-10, CRRID, Chandigarh.
10. Singh, Joginder and Dhaliwal, H.S. (2002), "Economic Analysis of Farm Enterprises in Punjab", in S.S. Johl and S.K. Ray (Eds.), *Future of Punjab Agriculture*, CRRID, Chandigarh.
11. Sidhu, R.S. and Johl, S.S. (2002), "Three Decades of Intensive Agriculture in Punjab: Socio-Economic and Environment Consequences", in S.S. Johl and S.K. Ray (Eds.), *Future of Punjab Agriculture*, CRRID, Chandigarh.

SPATIAL AND FARM SIZE GROUP VARIATION IN FERTILIZER CONSUMPTION & SUBSIDY : HARYANA

By

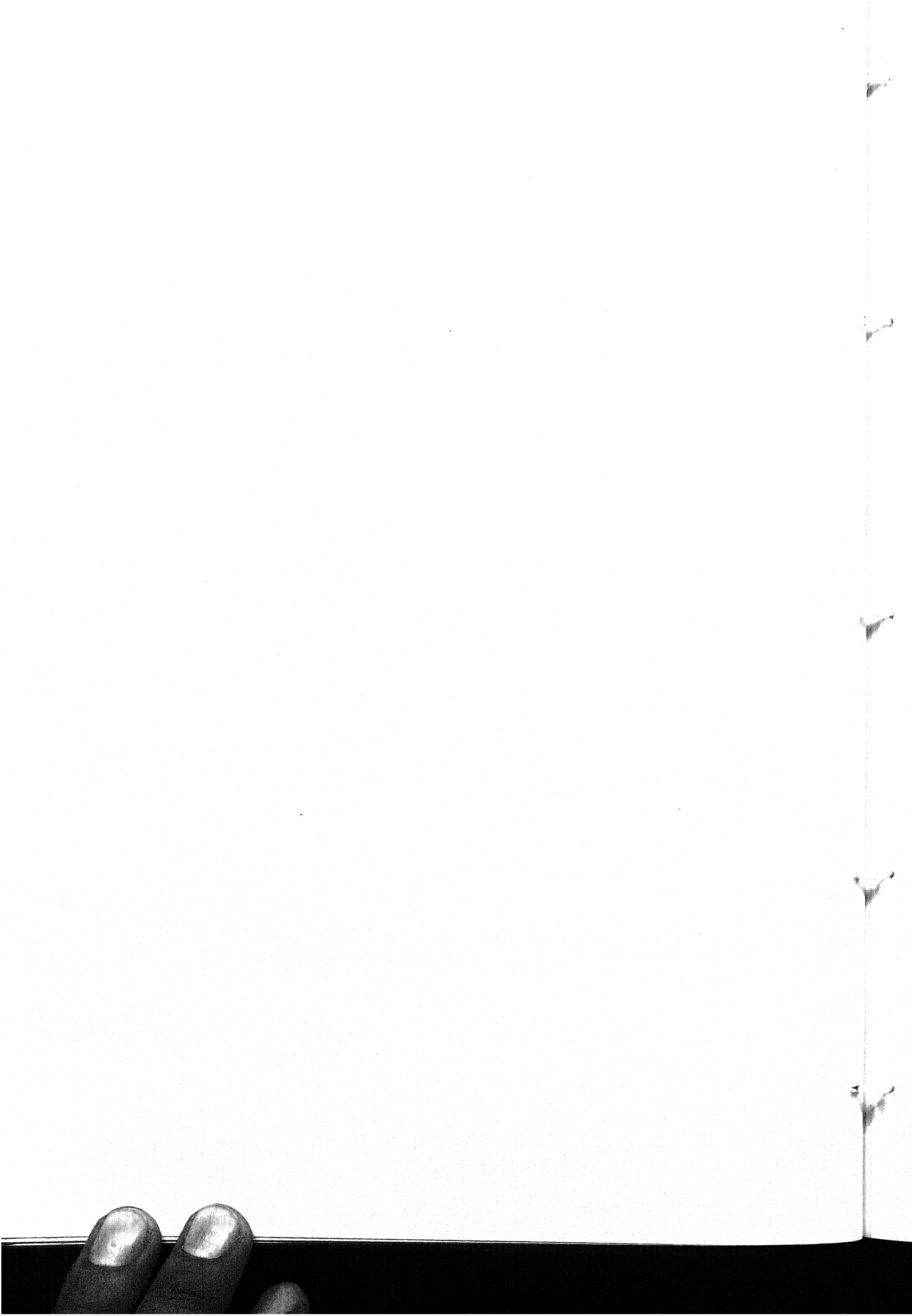
PREM S. VASHISHTHA
LINU M. PHILIP

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



SPATIAL AND FARM SIZE GROUP VARIATION IN FERTILIZER CONSUMPTION & SUBSIDY: HARYANA[1]

Prem S. Vashishtha[2] and Linu M. Philip[3]

Introduction

It is estimated that 70 to 80 per cent of increase in food grain production is due to fertilizer use (Singh 1997) and about 60 per cent of the incremental output of food grains between 1960-63 and 1987-90 is attributable to fertilizers (Vaidyanathan, 1977, Mellor, 1976; Sarma and Roy, 1979; Sarma and Gandhi, 1992). Use of fertilizer has also brought stability in yield of foodgrains and helped build resistance to climatic stress (Venkateshwarulu and Sen 2002). Increase in fertilizer consumption is associated with massive investments in irrigation, setting up a nationwide research and extension network, vast expansion of the credit and input distribution systems, and providing incentives to production and use of fertilizer (Desai & Vaidyanathan, 1995). As a result, total fertilizer use (in terms of nutrients) rose from 361, 000 tons in the early 1960s, to 2.3 million tones in the early 1970s and to around 17 million tones in 2003-04. Fertilizer consumption grew at the rate of 7 per cent per annum in the last three decades.

The increase in fertilizer consumption has been brought about through a pragmatic policy of keeping domestic fertilizer prices at 'affordable' levels. This policy involved huge subsidy on fertilizer. Subsidy on fertilizers (urea, complex phosphatic fertilizers like DAP, SSP, MOP) increased from Rs.600 million in 1976-77 to Rs.5050 million in 1980-81 and to Rs.43,890 million in 1990-91. In 2002-03, the subsidy had reached a high level of Rs.112 billion. The production of foodgrains is highly subsidized with concentration of fertilizer subsidy in certain regions. It has been argued that this entire subsidy does not go to the farming community. In fact, a substantial portion of fertilizer subsidy goes to fertilizer industry or feed stock supplying agencies (Anantha 1992). It was found that only 50 to 60 per cent of the budgetary subsidy went to the farmers (Gulati 1990, Gulati and Narayanan 2003).

In this study an attempt has been made to understand how fertilizer consumption has changed both temporally and spatially (across regions) and across farm-size groups within a state. The study has tried to relate (a) the fertilizer consumption with subsidy utilization by different groups of farmers, with focus on the marginal and small farmers of the state of Haryana and; (b) change in subsidy and fertilizer price and its impact on the production of food grains in Haryana.

---

[1] This work is based on the Research study No. 2005/2, (July 2005), completed by the authors at AER centre, University of Delhi, Delhi.

[2] Visiting Professor, Institute for Human Development, New Delhi-110002

[3] CENTAD, New Delhi.

Haryana has promoted and encouraged a diversified pattern of growth within its agricultural economy. The state has played a major role in green revolution and contributed to building a self-reliant food economy. It cultivates 3.2 per cent of the gross sown area of the country and contributes 6.27 per cent to food grain production. It uses 6 per cent of total fertilizer consumption in India (2002-03). Haryana has irrigation coverage of over 85 per cent but huge differences exist in fertilizer consumption across districts with Karnal coming in the group of first 15 per cent of districts and the district of Jhajhar falling in the last 15 per cent of the districts in all India in terms of per hectare fertilizer consumption (FAI 2003).

Keeping the above issues in view and the ongoing liberalization of the fertilizer sector, this study addresses the following questions:

(a) What are the differences in fertilizer consumption (per hectare) and its nutrients across:
   - Agro-climatic Zones
   - Crops
   - Size Groups?

(b) What is the share of small and marginal farmers in total fertilizer consumption and their share in fertilizer subsidy?

(c) What factors explain the variation in share in fertilizer consumption (and fertilizer subsidy) across size groups?

(d) Does location (biophysical factors) matter in affecting fertilizer consumption (fertilizer subsidy) by different size groups? Does land-use pattern within agriculture affect fertilizer consumption? What are the implications of variation in land use pattern in fertilizer consumption and the flow of associated fertilizer subsidy to different category of farmers?

The analysis has been carried out at the state as well as the sub-state (zonal) level. The broad category of zones viz; arid and semi arid have been formed on the basis of agro-ecological conditions encompassing regional characteristics like cropping pattern, length of growing period, soil type, rainfall, etc.

The report has been divided into Six Chapters. Chapter two covers the trends in fertilizer consumption at the all-India level and for the state of Haryana. Chapter three focuses on the spatial pattern of fertilizer use in Haryana. Chapter four illustrates the variation in fertilizer use across farm size groups in Haryana vis-à-vis all India and includes a sub-section on projections of fertilizer use on different category of farms for the year 2002-03. Chapter five examines the division of budgetary subsidy on fertilizer between farm and industry along with equity aspect of economic subsidy across farm size groups and regions. It also tries to assess the impact of reduction in fertilizer consumption (via reduction in subsidy) on the food grains production. The final Chapter contains the main findings and policy implications.

II. Temporal Variation in Fertilizer Consumption

II.1. Fertilizer Production and Consumption Trends

The total fertilizer consumption in India has increased phenomenally from 1228.3 thousand tons in TE 1972-73 to 14,538.9 thousand tons in TE 2002-03, an increase of 6.53 times over a period of three decades. The use of fertilizer per hectare of sown area also increased from 15.6 kg/hect. in TE 1972-73 to 87.7 kg/hect. in TE 2002-03.

A distinct feature of fertilizer consumption in India is that the production of fertilizer has risen faster than its consumption over the three decades (1972-73 to 2002-03). The growth of production of fertilizer was 8.33 per cent and that of consumption 6.83 per cent p.a. during 1972-73 to 2002-03. India had to import 36.7 per cent of its fertilizer consumption requirement in TE 1972-73, which declined to 13 per cent in TE-2002-03 due to a faster rise in production than consumption over this period. The fertilizer consumption (NPK) decelerated from its growth rate of 10.02 per cent and 7.79 per cent in seventies and eighties to 3.92 per cent in the nineties. In the post decontrol period (1992-93 onwards), the fertilizer consumption growth dipped to 3.77 per cent. No doubt, the production of fertilizer increased by a substantial margin in 90's (say, 5.12% pa.), the achievement of self-sufficiency so soon is attributable partly to a fast deceleration in fertilizer consumption in the post decontrol period i.e. 1992-93 to 2002-03.

Section II.2.2 Fertilizer Consumption: India and Haryana

In both Haryana and India urea (the main source of nitrogenous fertilizer) occupies the major share of total fertilizer consumption. At the all India level SSP and other fertilizer mixtures still play much more important role than in Haryana. In the latter, the role of other mixtures and micro nutrients is fairly negligible (Table E-1).

Table E-1
Relative Importance of Different Fertilizers in total Fertilizer Consumption (%)

Fertilizer (TE 2002-03)	Haryana (TE 2002-03)	India (TE 2002-03)
Urea	72.58	52.87
DAP	24.13	16.47
MOP	0.93	7.62
SSP	0.63	7.14
Other	0.02	0.16
TOTAL	100.00	100.00

Source: Fertilizer Statistics, various issues

The share of fertilizer consumption of Haryana in India has increased consistently over the decades. In the early 70s the Haryana's consumption share was around 3 per cent of total fertilizer consumption; it increased to 5.7 per cent in TE 2002-03.

The growth in fertilizer consumption has decelerated over the last three decades both in India and Haryana. The fertilizer consumption grew at the compound growth rate of 8.48 per cent p.a. in the seventies which declined to approx 3 per cent p.a. in the nineties at the all India level. The compound

growth rate of fertilizer consumption in Haryana was 12.83 per cent p.a. and 4.48 per cent p.a. in the seventies and eighties, respectively. The fertilizer consumption decelerated much faster at the all India level than in Haryana. Consequently, the share of Haryana in total fertilizer consumption in India increased from 3.09 per cent in TE 72-73 to 4.89 per cent p.a. in TE 92-93. With the decontrol of fertilizer prices during the nineties the relative share of Haryana in total fertilizer consumption increased from 4.89 per cent in TE – 92-93 to 5.66 per cent in TE 02-03.

The consumption pattern of fertilizer can be further disaggregated into the two main cropping seasons, viz Kharif and rabi. The major part of fertilizers used to be consumed in the rabi season, its share being around 65 per cent in TE 72-73. This share has come down to 53 per cent recently (TE 2002-03). Irrigation is one of the most important factors accounting for differences in the level of fertilizer in rabi and kharif seasons as the rabi crops are grown in selected pockets with well endowed irrigation facility.

Nutrient wise composition indicates that fertilizer consumption level is tilted towards rabi crops. In a state like Haryana, more than 60 per cent of the total fertilizer is consumed in rabi season. One of the main reasons for higher consumption in rabi is the low risk in yield realization in crops like wheat grown in this season. In spite of that, the declining share of rabi season in N.P. & K is clearly discernible.

Section II.2.3 Fertilizer cost in total cultivation cost

The cost of cultivation varies across crop enterprise and across regions for the same crop. Share of fertilizer in total cost assumes special significance due to subsidy on fertilizer from the Central Government. A comparative picture of cost in fertilizers of important crops of Haryana in presented in Table E-2.

Table E-2

Share of Fertilizer Cost in operational Cost of Major Crops Grown in Haryana

(%)

Crops	70s	80s	1999-00
Paddy	21.90	16.17	16.21
Wheat	26.37	27.78	17.10
Bajra	1.73	13.93	5.49
Sugarcane	-	13.51	39.09
R&M	-	15.85	13.25
Cotton	9.20	6.71	5.71

The relative importance of fertilizer is declining over the years with other factors assuming greater importance in cultivation. This is true of Haryana also for all major crops, except sugarcane. The relative share of fertilizer cost with respect to the total operational cost is higher for Haryana and Punjab than for Andhra Pradesh for cultivation of paddy. The share of cost of fertilizer in paddy cultivation was around 20 per cent in these three states in the 70s which came down to 15 per cent in most of the states.

Section II.2.3 Fertilizer Policy

The fertilizer self-sufficiency was attained through substantial increases in production of domestically produced nitrogenous and phosphatic fertilizers. Meeting fertilizer demand to achieve food security targets mainly through imports involves considerable risk as the fertilizer prices fluctuate considerably due to volatile oil price situation in the global economy. The volatility of international prices of fertilizer has remained higher than the domestic prices. The Coefficient of Variation (CV) of fertilizer prices (composite[1] price of NPK) in the international market was 36.4 and 18.4 for the pre-decontrol and post-decontrol period[2], respectively, which was much higher than the CV of fertilizer price in the domestic market for the corresponding period, (i.e. 12.9 and 15.0, respectively).

The stability of fertilizer price in the domestic market has been primarily due to the prevalence of statutory nature of domestic price and subsidy to the domestic fertilizer industry as well as the farming community.

There exists a strong link between fertilizer consumption and food grain supply even today (Kanwar, 2004). The decline in growth rate of food grain production in the nineties is associated with the decline in growth of fertilizer consumption, although the yield of foodgrain may have remained stagnant due to decline in total factor productivity (TFP) in the crop sector on account of absence of further technological break through (Kumar, 2002).

III. Spatial Variation in Fertilizer Consumption

Fertilizer consumption varies with the types of crops grown/cropping systems followed in a region/ State. In irrigated regions like Punjab and Haryana crop productivity has not increased in proportion to the increase in the use of fertilizers. Both fertilizer consumption and crop yield seem to be plateauing and moving together. However, this may not necessarily be true of all the zones/sub-regions within the sate of Haryana as the factor endowments do vary across zones. It is therefore, essential to examine the pattern of spatial variation in fertilizer consumption and the yield of major crops across zones and understand the reasons thereof.

II.1. Agro-Ecological Regions in Haryana

As the reorganization of various districts have taken place several times and the origin of the districts formed at a later stage have the original agro-ecological parameters of the mother districts, the districts have been classified under the two main agro-eco zones viz. hot semi-arid and hot arid ecological region (Fig.1 & Table E-3).

---

[1] The period prior to decontrol, post decontrol and the entire period refer to 1981-82 to 1991-92 and 1992-93 to 2002-03.

[2] The composite prices were worked as the weighted prices of the three major nutrient Nitrogen (N), Phosphorus (P) and Potassium (K) prices with weights as share of individual nutrients in total nutrient consumption.

It may be emphasized that the choice of confining to two main agro-ecological regions is dictated by the considerations of understanding certain socio-economic phenomena in terms of broad generalizations and not by claiming to be too precise about the phenomena analyzed/discussed in this report at the disaggregated level. This approach permits us to analyze certain policy issues with a broad perspective.

The semi arid region has higher rainfall and higher proportion of irrigated area (711 mm and 89 per cent, respectively) as compared to arid region (403 mm and 79 per cent, respectively). In terms of cropping intensity (CI) and irrigation intensity (II) the Semi-arid region (CII- 172; II-181) has a better performance than the arid region (CII- 167; II- 172). Semi-arid region is a cluster of better performing districts with higher irrigation intensity and higher foodgrain yield.

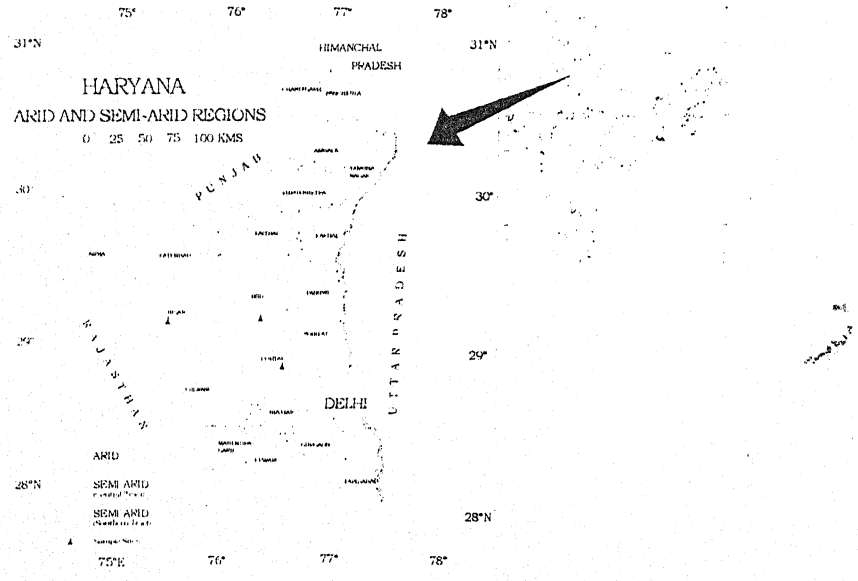
Table-E.3
Agro-ecological classification of Haryana districts in the study

Agro-Ecological Region	Districts*
Hot Arid-Saline soil	Sirsa, Hissar, Fatehbad Bhiwani, Mahendragarh, Rewari
Hot Semi-Arid-Alluvial Derived Soil	Jind, Rohtak, Jhajhar, Kaithal, Kurukshetra, Karnal, Panipat, Sonipat, Gurgaon, Faridabad, Ambala, Panchkula, Yamunagar.

* The basic classification of districts was done on the basis of 1971 census list of districts. This facilitated comparison in change in certain socio-economic parameters over time.

Fig. 1

Agro-Ecological Zones of Haryana



The regional fertilizer consumption trend is illustrated in Table E-4. It is found that the share of arid zone in fertilizer consumption has increased over the years as compared to the semi-arid region.

The following features emerge from the fertilizer consumption pattern of the two regions:

- The share of arid region increased relative to the semi-arid region
- Growth of fertilizer consumption declined at different rates in different periods.

The growth in fertilizer consumption in Haryana has fallen consistently by 4 per cent between the decades, beginning seventies. However, the decline has been different for the two regions. Deceleration in fertilizer consumption was much faster in the semi-arid region than in the arid region in the eighties but the situation changed in the nineties when fertilizer consumption declined at a faster pace in the arid region (Fig.2). The overall fertilizer consumption (state level) increased only at 4 per cent per annum in the nineties. Consequently, growth of fertilizer consumption in the state from seventies to the beginning of the new century (i.e. 1972-73 to 2000-01) increased at 8 per cent per annum only.

The high growth in the arid region in the 1980s was the result of increase in area under high yielding varieties and the irrigation intensity which moved above the state level growth in the 1980s.

It is evident that as the agricultural development progresses, the 'lesser developed' region catches up with the developed region in respect of certain development indicators such as irrigation intensity, adoption and coverage of high yielding varieties, and fertilizer consumption. At the same time, the growth of these parameters in the 'more developed' region (semi-arid) slows down relatively.

Table E-4

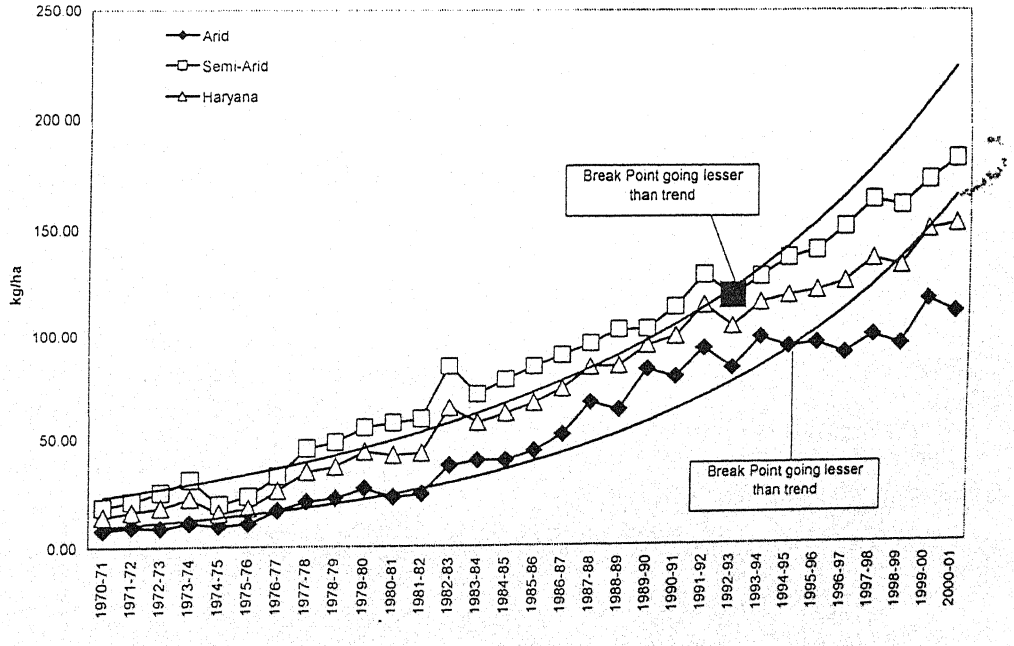
Annual Compound Growth Rate of Fertilizer Consumption per ha GCA of different zones in Haryana

(percentage per annum)

Triennium Ending / Regions	TE 72-73 TE 82-83	TE 82-83 TE 92-93	TE 92-93 TE 00-01	Whole Period (1972-73 to 2000-01)
Arid Region	12.65	11.66	3.16	9.88
Semi-arid Region	12.14	6.81	4.45	8.30
Haryana	12.00	8.16	4.01	8.62

Source: Computed from Fertilizer Statistics, various issues

Fig 2 Trend in Regional Consumption of Fertiliser per hectare of GCA



Cropping Pattern & Fertilizer Consumption:

The decline in growth of fertilizer consumption in the arid region in the 1990s has shown two features: one it has gone below the rate in the 1980s and, second it has gone below the growth rate of fertilizer consumption of the semi-arid region. In the arid region, growth of fertilizer consumption has dipped in spite of a consistent increase in the irrigation and High yielding varieties area in the 1990s. The change in fertilizer consumption across regions in the nineties may have something to do with the change in land use pattern or cropping pattern (relative area allocation to foodgrain vs. non-foodgrain crops). Arid region has agro-ecology conducive to grow cotton, oilseeds and wheat. The spurt in fertilizer consumption in the eighties was facilitated by a diversified cropping pattern brought about by more area allocation to oilseeds and other non-foodgrains which witnessed a sharp increase at the rate of 2 per cent per annum in the eighties. This was accompanied by increase in irrigated area also.

The decline in fertilizer consumption in the arid region in the nineties can be attributed to the decline in area under non-food grains.

Growth in Yield Levels

The decline in fertilizer consumption (per hectare) based on area allocation would be incomplete with out understanding the changes in the productivity of the two regions. Food grain yield is higher in the semi-arid region than arid region. It has grown consistently in both arid and semi-arid regions. However, there has been a significant drop in the yield (rate of increase) in the 1990s. The fact that foodgrain yields have either remained stagnant or declined some what in recent years (late nineties) is true of both the regions (Table E-5). The foodgrain yields have stabilized around 1767 kg./hectare in the arid region; 2329 Kg./hectare in the semi-arid region and 2111 Kg./hectare in the Haryana State. The decline in fertilizer consumption and the decline in growth of food grain yield over the three decades show that in absence of technological change in land use pattern is being interpreted as change in cropping pattern.

Table E-5

Level of Foodgrain Yield in the Arid and Semi-arid Regions (Kg./Hectare)

Triennium Ending	Arid Region			Semi-arid Region			Haryana		
	Paddy	Wheat	Foodgrain	Paddy	Wheat	Foodgrain	Paddy	Wheat	Foodgrain
TE 82-83	2578	2260	1008	2370	2133	1580	2387	2164	1352
TE 92-93	2989	3315	1660	2538	3062	2389	2579	3134	2108
TE 00-01	2979	4042	2632	2553	3895	3017	2589	3945	2872
Whole Period (1982-83/2000-01)	2848	3207	1767	2480	3030	2329	2518	3081	2111

Table E-6

Growth Rate of Fertilizer consumption and foodgrain yield of different regions of Haryana

(%)

Triennium Ending	Arid Region		Semi-arid Region		Haryana	
	Fertilizer	Foodgrain	Fertilizer	Foodgrain	Fertilizer	Foodgrain
TE 82-83	12.65	4.24	12.14	3.41	12.00	3.59
TE 92-93	11.66	6.62	6.81	3.99	8.16	4.84
TE 00-01	3.16	3.38	4.45	1.38	4.01	2.08
Whole Period (1982-83/2000-01)	9.88	5.02	8.30	3.15	8.62	3.73

A higher growth rate of fertilizer consumption is needed to sustain a growth in yield of food grain crops. In 1980s in spite of a falling growth rate of fertilizer consumption a higher yield growth of food grain was achieved in both zones of Haryana. In the nineties, for the arid region a higher food grain growth was achieved with much less consumption of fertilizer per hectare. In semi-arid region, food grain yield has stagnated faster in spite of a relatively faster growth in consumption of fertilizer. It implies that additional doses of fertilizer (per hectare) were associated with much lesser foodgrain output (per hectare) in the nineties than in the eighties.

Imbalance in Fertilizer Consumption:

The imbalance in nutrient consumption ratio is higher in the arid zone than in the semi-arid zone (Table E-7). However, these ratios alone do not necessarily reflect the degree of imbalance in soil and fertility as the two regions have different cropping pattern leading to difference in the extent of removal and addition of nutrients in the soil.

Table E-7
Nutrient Consumption Ratio (N.P.K) of different zones in Haryana

	TE 72-73	TE 82-83	TE 92-93	TE 00-01
Arid Zones	36 : 2.7 : 1	20 : 3.6 : 1	285 : 109 : 1	143 : 47 : 1
Semi arid	29 : 3.0 : 1	20 : 2.9 : 1	82 : 24 : 1	98 : 27 : 1
Haryana	30 : 3.0 : 1	20 : 3.1 : 1	109 : 35 : 1	109 : 32 : 1

Source: Computed From Statistical Abstract of Haryana, various issues.

It is evident that in semi arid region removal of nutrients from the soil is larger than that observed in the arid region. Although the soil nutrient imbalance in the semi-arid region has been partly mitigated by replenishment of nitrogen through higher doses of fertilizer, the imbalance with respect to other nutrients still persist to a large extent. **In the arid region, the soil nutrient imbalance continues to exist even with respect to nitrogen.**

There is an urgent need to counter the imbalance in application of NPK to sustain the soil fertility in both regions as the present consumption pattern has serious implication to the soil fertility and growth of productivity of the region. The growing imbalance of nutrients can only be corrected through comprehensive policy initiatives through better crop mix and nutrient management supported by the appropriate correction in nutrient pricing policy. Promotion of extensive use of organic manures is also desirable.

IV. Variation in Fertilizer Consumption Across Farm Size Groups

IV.1 By Farm Size

The fertilizer consumption (per hectare) pattern across size groups shows opposite tendency for India and Haryana. It decreases with farm size for India but increases with farm size in Haryana. It reveals an interesting pattern that ***in 1980s the small farms of the country used higher quantity of fertilizer per unit of fertilised area than their counterparts in Haryana.*** By the turn of the decade the pattern reversed – ***the small farms of Haryana were using more fertilizer per ha than those in all India.*** Not only the adoption rate but also the intensity of fertilizer use among the small farmers of Haryana rose faster than that observed for their counterparts in India as a whole.

Table E-8
Fertilizer consumption (NPK) per hectare of fertilized area
(Kgs.)

	India	Haryana	India	Haryana
Category	1981-82	1981-82	1991-92	1991-92
Marginal	92.30	85.80	113.42	159.50
Small	85.80	79.78	104.58	148.80
Semi-medium	80.10	78.46	101.30	146.60
Medium	71.10	85.41	96.97	159.60
Large	59.00	82.96	98.08	192.70
All Size Groups	76.40	82.95	102.76	162.50

Source: Input Survey 1981-82 and 1999-92 (Results of Input Survey 1995-96 are yet not available)

The difference in fertilizer application per hectare between small and large farmers declined for both Haryana and India overtime. For Haryana, this difference became almost negligible by 1991-92.

By Crop

Crop wise fertilizer use pattern indicates that fertilizer consumption is concentrated on selected crops like rice, wheat, sugarcane and cotton both in Haryana and India. In India, there is a clear evidence that in 1991-92 few selected crops consumed more fertilizer. Rice and wheat together covered 40 per cent of total GCA and consumed 54 per cent of fertilizers (Table E-8). Sugarcane and cotton had a combined allocation of 12 per cent of area and consumed 15 per cent of fertilizer in India.

In Haryana too, fertilizer use is concentrated more on food grain crops like paddy and wheat (70 per cent) in comparison to India. However, their share has marginally declined in 1991-92 in comparison to 1986-87 (Table E-8).

Table E-8
Percentage Share of Fertilizer used on Individual Crops : Haryana

Farm Size	Rice		Wheat		Food Grains$		Cotton		Sugarcane	
	86-87	91-92	86-87	91-92	86-87	91-92	86-87	91-92	86-87	91-92
Marginal	22.24	23.18	55.31	41.02	79.25	65.58	4.92	4.96	4.99	3.80
Small	21.50	21.79	58.83	46.94	82.07	70.31	5.93	5.04	5.25	5.01
Semi-medium	22.22	21.75	54.08	47.19	78.18	70.47	6.83	5.52	5.23	3.88
Medium	20.15	21.74	48.50	54.72	70.32	77.78	8.53	7.19	6.00	3.35
Large	15.06	19.09	47.70	42.74	64.74	63.43	10.96	7.21	3.35	1.93
All Size Groups	19.52	21.17	50.88	48.20	72.20	70.83	8.31	6.45	5.01	3.30

Source: Input Survey, 1986-87 and 1991-92
$ Food grains includes only Rice, wheat and bajra.

The share of fertilizer consumption by farm size reveals that the combined share of marginal and small farmers has increased between the two periods. The increase was reported in most crops except cotton. *The share of large and medium farms in fertilizer consumption declined in all crops in India.*

In Haryana, the pattern was different –the share in fertilizer consumption of marginal and small farmers for all crops increased (16.92 to 17.57 per cent) but the share of major crops like paddy and wheat declined. It suggests that the increase of fertilizer consumption among the small and marginal farmers was the result of increased use of fertilizer in non-food grain crops. This may have resulted from policy initiatives to increase area allocation on non-food grains, especially oilseeds in the eighties.

The crop wise and farm size wise fertilizer use has certain interesting features as summarized below:

- The level of fertilizer use by small farms in Haryana is higher than that for all India with the exception of cotton crop.
- In all India, the fertilizer use in wheat is higher than that in paddy, the reverse holds true in Haryana.
- The projection for the year 2002-03 reveals that the share of marginal and small farms in fertilizer consumption will be almost equal (50.5%) to that of medium and large farmers in India.
- In Haryana, the medium and larger farmers will still (2002-03) hold the major share of fertilizer use (47.4%) in spite of significant increase in the share of marginal and small farmers over the last two decades.

Table E-9

Share in Fertilizer Consumption by Farm Size : India & Haryana

Farm Category	India			Haryana		
	1980-81	1991-92	2002-03(Est.)	1980-81	1991-92	2002-03 [Est.)
Marginal	12.20	20.58	27.34	3.94	7.41	17.42
Small	18.50	21.15	23.19	6.54	10.71	12.62
Semi-medium	28.20	24.18	23.24	17.65	21.55	22.57
Medium	29.90	23.86	19.05	39.49	35.03	29.37
Large	11.20	10.23	7.18	32.39	25.85	18.02
All Size Groups	100.00	100.00	100.00	100.00	100.00	100.00

Est.: Estimated

V. Distributive Implications of Fertilizer Subsidy[3]

V.1 Fertilizer Subsidy and Distribution

In the context of fertilizer use and the related subsidy, two main issues need to be addressed. At one end, farmers need to be given fertilizers at affordable price, and second, adequate supply of fertilizer should be made available in the market to meet production targets. The marginal and small farmers have low marketable surplus and the benefits of minimum support prices are not fully realized by this group. An increase in cost of fertilizer input may adversely affect the small and marginal farmers through reduction in fertilizer subsidy.

The fertilizer subsidy forms around 0.65 of the GDP of the country and 2.83 per cent of the agricultural GDP Subsidy is 1.44 times that of public investment in agriculture. This indicates the magnitude of fiscal resources the country puts in to get the target consumption of fertilizer and foodgrain production. The rate of increase of fertilizer subsidy has been much faster than the rate of consumption of fertilizer and the foodgrain production.

To compare the extent of subsidization we have estimated the composite price which is the representative price of all nutrients (NPK) based on the consumption share of the nutrients. It was observed that the international prices were higher than the farm gate prices. The growth in budgetary subsidy on fertilizer was to the tune of around 7 per cent and surpassed growth rates of other prices. The growth rate of subsidy price paid by central government was in excess of the growth rate of international prices and reveals an asymmetric growth rate in prices at domestic and farm level.

The relative position of fertilizer subsidy on per hectare basis indicates that (i) Budgetary subsidy on fertilizer per hectare more than doubled in 2002-03 as compared to the initial phase of liberalization (1992-93), and (ii) Haryana State enjoyed much higher fertilizer subsidy per hectare (Rs.980.6) than that observed for all India (Rs.580.5) in 2002-03 (Table E-10). The difference in of subsidy to farmers in Haryana and India are mainly due to the difference in proportion of irrigated area and productivity levels in the two areas.

[3] This section draws substantially from Vashishtha and Philip (2004) and Vashishtha (2005)

Table E-11
Budgetary Subsidy on Fertilizer Per Hectare (Rs.)

Year	Haryana	India
1981-82	26.69	21.22
1993-94	426.12	244.49
1999-00	723.84	460.84
2002-03	980.57	580.47

The better-endowed regions (irrigation& soil), with developed infrastructure are likely to consume more fertilizer per hectare. These regions are likely to benefit more from fertilizer subsidy than other regions. With the process of other regions catching up in terms of increase in growth rate in irrigated area and productivity levels, the growth of fertilizer consumption and the use of fertilizer subsidy in the developed regions may decline overtime.

Gainers of Fertilizer Subsidy:

Distinguishing between budgetary and 'economic' subsidy permits to assign the relative benefit of subsidy to farmers and to fertilizer industry, including feed stock supplying agencies. *Economic subsidy is the difference between the Import Poverty Price (IMPP) and the domestic price of different fertilizers.* IMPP indicates the price that farmers would have paid in the scenario of free trade. Gulati and Naryanan (2003) have worked out economic subsidy which we have extended to year 2000-01 to 2003-04 for India and also computed for the state of Haryana.

Results obtained reveal that:

(a) On average, during the eighties and nineties, the fertilizer industry was significantly subsidized as about one-third of the Central Government Budgetary subsidy on fertilizer went to the industry.

(b) The peak level of subsidy to the farmers accrued in TE-1995-96 (127.83%), implying that not only the entire subsidy went to the farmers but the fertilizer industry was net taxed depriving it of the potential benefits that could have accrued to it to the tune of 27.83 per cent of the total fertilizer subsidy. This happened due to prevalence of abnormally high price of urea in the international market during TE-1995-96.

The fertilizer subsidy distribution across different zones was estimated based on their share in fertilizer consumption in Haryana. The higher fertilizer use per hectare of GCA in semi-arid region manifests higher use of fertilizer subsidy per hectare than the state as a whole. This implies that the use of fertilizer subsidy is not uniform across regions within a state. The use of fertilizer subsidy is

concentrated in the semi-arid region in Haryana where use of fertilizer is more than double the use per hectare of GCA than in All India (Table E-11).

Table E-11
Fertilizer Economic Subsidy Across Agro-Ecological Zones of Haryana

Triennium Ending	Fertilizer Subsidy Use (Rs. Crores.)			Fertilizer Subsidy Use (Rs per hectare)		
	Arid	Semi-Arid	Haryana	Arid	Semi-Arid	Haryana
TE 82-83	6	19	25	23	57	42
TE 92-93	98	192	290	339	535	448
TE 00-01	239	529	769	642	1118	905

As discussed in the case of fertilizer use, the level of fertilizer subsidy for hectare is linked with the cropping pattern in a region/zone. Diversification away from paddy, especially in the semi-arid zone will have reduced fertilizer subsidy and also prevent further degradation of water resources.

Subsidy by Farm Size:

In Haryana the small and marginal farmers were using a much lower quantum of subsidy in 1991-92 than their medium category counter parts. However, in 2002-03, they are anticipated to have a higher quantum as compared with the medium category of farms (Small farms-Rs.979/ha; medium farms-Rs.929/ha) (Table E-12). The distribution of fertilizer subsidy is also likely to become more equitable overtime the share in subsidy of small and marginal may have increased from less than 18 per cent in 1991-92 to 30 per cent in 2002-03 and that medium and large may have declined from 88 per cent to 70 per cent over the same period. However, the distribution of fertilizer subsidy across size group is likely to remain more unequal in Haryana than in India.

Another interesting feature of fertilizer consumption by different category of farms is that *small farmers in Haryana get higher subsidy per hectare than their counterparts in India.* This reveals a more even and intensive spread of fertilizer use by small farmers in high productivity regions like Haryana than small farmers in India. Further, within Haryana, the inequity in respect of fertilizer use between small farmers and large farmers is declining over time.

Table E-12
Level and Distribution of Fertilizer Economic Subsidy by Size Group in India and Haryana
(Rs/ha)

Category	Haryana				India			
	Rs./Hectare		% Share		Rs./Hectare		% Share	
	1991-92	2002-03	1991-92	2002-03	1991-92	2002-03	1991-92	2002-03
Small(1)	421	979	17.57	30.04	259	671	41.73	50.53
Medium(2)	438	929	56.58	5.94	222	553	48.04	42.29
Large	488	1096	25.85	18.02	174	438	10.23	7.18
All	447	981	100.00	100.00	229	580	100.00	100.00

Note: 1. Combined Marginal & Small Farmers.
2. Combined Semi-medium and Medium Farmers.

Food Security Implications

The fertilizer demand elasticity is -0.44 for the state of Haryana and -0.35 for India (Storm, 2001). The yield Response Elasticity to Fertilizer prices is more pronounced in Haryana (1.12) than in India (0.20, Gandhi et.al, 1994).

The impact of increasing the price of urea by 12.2 per cent will reduce the yield in paddy by 1.78 per cent and 1.58 per cent in Haryana and India, respectively. This decline in yield would result in decline of total cereals by 0.77 million tons in Haryana and 3.96 million tons in India (Table E-13). A given increase in price of fertilizer leads to a larger decline in quantity of wheat production than of other cereals as the yield response of the former is much higher than that of the later.

The decline in fertilizer use on account of the 'phased' annual increase in prices of urea will have serious implication in foodgrain production. An effort to reduce fertilizer subsidy is likely to result in fall in food grain production and may even necessitate import of food grains to meet food security targets. In monetary terms an annual increase of fertilizer price by 12 per cent in the year 2003-04 would have resulted in a saving of only Rs.25 million on fertilizer subsidy. The cost of importing food grains on account of loss in production of cereals would have costed the exchequer Rs.32 billion (cost of importing 3.96 million tons of rice and wheat at the prevailing international price).

Table E-13

Decline in yield and Production of Main Cereals due to Increase in Fertilizer Price

Crop	Decline in Yield (%)		Decline in Cereal Production (Million Tonnes)	
	Haryana	India	Haryana	India
Paddy	-1.78	-1.58	0.04	1.32
Wheat	-7.32	-2.92	0.68	2.02
Coarse Cereals	-7.08	-0.61	0.05	0.61
Total Cereals			0.77	3.96

Source: Using Elasticity of fertilizer prices on yield of respective crops from Annexure A-7 for Haryana and from Storm (2001) for India

VI. MAIN FINDINGS AND POLICY IMPLICATIONS

1. Fertilizer Consumption Across Size Groups.

a) **Fertilizer Coverage:**

Small farmers have better fertilizer coverage as compared to the large farmers. The coverage pattern has inverse relationship with farm size i.e. as farm size increases the fertilizer coverage decreases.

b) **Growth of Fertilizer Consumption :**

Marginal and small farms have reported a faster growth in fertilizer consumption as compared to middle and large farms in both Haryana and India. Small farms, in regions like Haryana, have lesser share in total fertilizer consumption than their counterparts in India; they are likely to have higher share than large farmers in course of time if the present growth pattern continues.

c) **High Fertilizer dose on Rice & Wheat:**

Fertilizer consumption of rice and wheat in Haryana is more than double that of observed for these crops in all India.

d) **Projected Fertilizer Consumption :**

It is expected that share of small and marginal farmers in fertilizer consumption will exceed the share of rest of the categories in India. The share of fertilizer consumption of small and marginal farmers in Haryana may have increased to 30 per cent of the total consumption in 2002-03 from a small share of 10 per cent in the 1980s.

2. Fertilizer Consumption and Subsidy Implications.

e) Increase in Share of Fertilizer Subsidy of small farms

The fertilizer consumption projections show that the major beneficiaries of fertilizer use and subsidy in course of time will be the marginal and small farmers. They may have got fertilizer subsidy worth Rs.5500 crores in India and, in Haryana, Rs.190 crores in 2002-03. The share of marginal and small farmers in total fertilizer use in Haryana increased from 10.5 per cent in 1980-81 to 30.0% ion 2002-03.

f) Rising fertilizer subsidy per hectare of smaller farms

In India, marginal farms are expected to utilize higher fertilizer subsidy per hectare than large farms in the course of time. The marginal farms in Haryana are expected to surpass the medium category of farms in respect of their share in fertilizer subsidy but may lag behind large farms.

g) Narrowing Subsidy Gap Across Regions:

The ratio of fertilizer subsidy per hectare of Haryana and India of all size groups was 2.81 in 1991-92 which came down to 2.5 in 2002-03. It is true that the regions with better irrigation and infrastructure are likely to benefit more from fertilizer subsidy than other regions. Taking a dynamic view, the gap in fertilizer consumption and the utilization of fertilizer subsidy per unit of land between the developed and the less developed regions is likely to narrow down significantly with the process of faster rise in productivity level of the latter regions than the former regions.

h) Food security Implication.

An increase in fertilizer price (decrease in subsidy) will reduce fertilizer consumption by 5.4 per cent and 4.3 per cent in Haryana and India, respectively. The impact of decline in fertilizer consumption through increase in prices will be in terms of decline in food grain production by 0.77 million tones in Haryana and by 4 million tonnes in India. The decline in fertilizer use on account of the new fertilizer policy has serious implications to foodgrain production. The cost of foodgrain imports (Rs.35 billion at the prevailing international prices of rice and wheat) is likely to be far greater than savings as fertilizer subsidy. The fertilizer subsidy may be retained for the small and marginal farmers.

3. Policy Implications

i) Nutrient imbalance has aggravated in Haryana in the post decontrol period which is partly the consequence of subsidy policy more favorable to nitrogenous fertilizers. Relative prices should move in a direction so as not to encourage too much use of nitrogen in relation to other nutrients. Diversion of part of fertilizer subsidy going to medium and large farmers could be utilized to promote bio-fertilizers. At the same time, the extension services need to be activated to educate the farmers for balanced application of fertilizer.

ii) Skewed distribution of land leads to unequal distribution of benefits of fertilizer subsidy both spatially and across size groups. Policies aiming at reducing interregional differences in agricultural productivity levels (irrigation, infrastructure, diffusion of technology, marketing network, etc) also promote equitable distribution of fertilizer subsidy across regions and across

farm size groups. Haryana's study offers an interesting case for reducing inter zonal inequity in distribution of fertilizer subsidy.

iii) The idea of reduction of fertilizer subsidy should be pursued with caution. The utilization of fertilizer subsidy indicates that the major beneficiaries are likely to be marginal and small farmers. A uniform approach to reduction of all types of subsidy is not justified. A well-thought out, sequenced, gradualist and regionally differentiated approach to subsidy reduction needs to be adopted. Should the Government (Central/and/State) aim at helping the small and marginal farmers, they could have differential rates of subsidy for the small and marginal farmers on the one hand and the medium and large farmers on the other. This could be done through issuing 'fertilizer coupons' to the small and marginal farmers. This would help (i) to reduce subsidy burden; and (ii) bring more equity in utilization of fertilizer subsidy.

ANALYSIS OF KERALA'S AGRICULTURE UNDER WORLD TRADE ORGANISATION

By

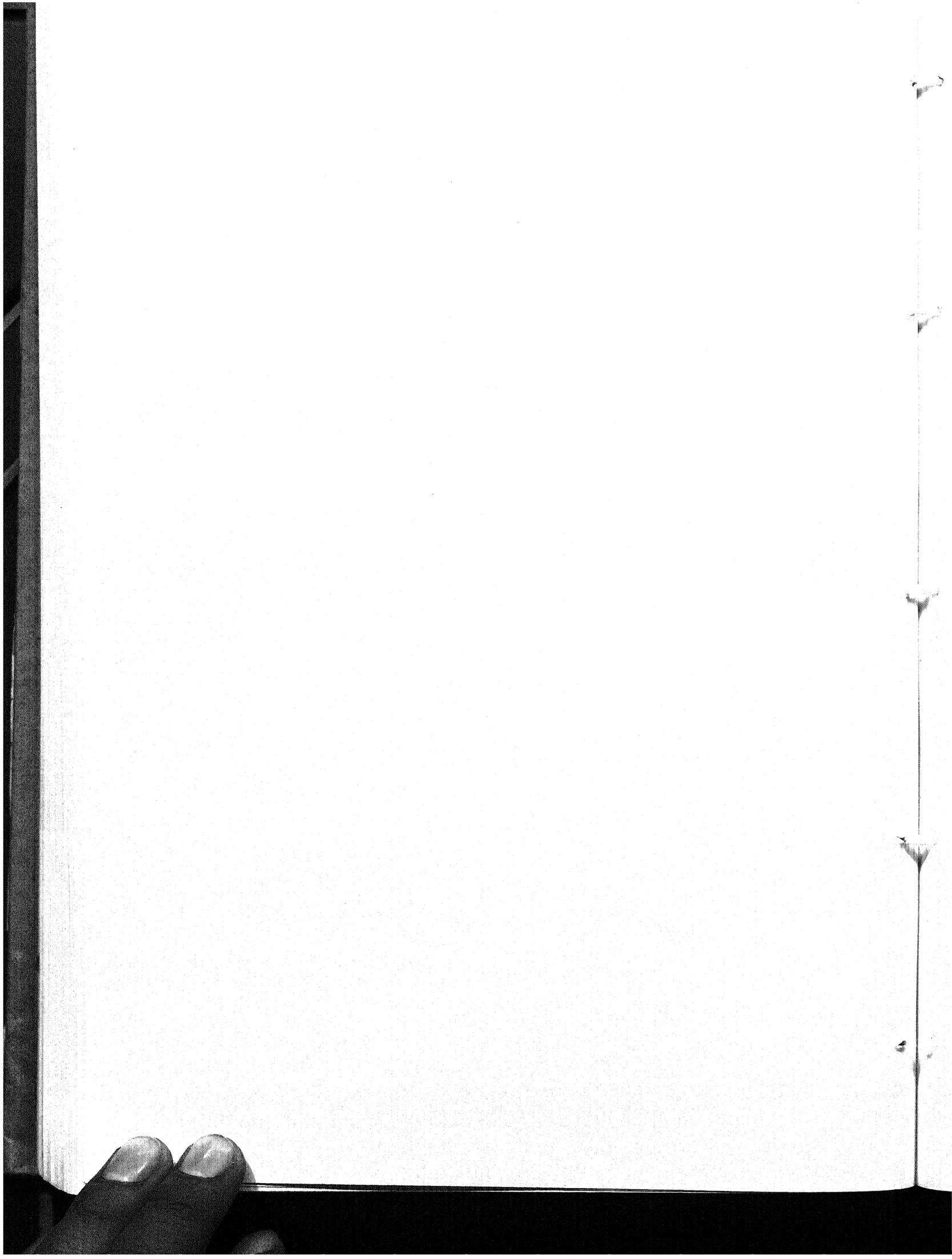
K. PUSHPANGADAN

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



.ANALYSIS OF KERALA' S AGRICULTURE UNDER WORLD TRADE ORGANISATION

K. Pushpangadan, Centre for Development Studies, Kerala, India

Introduction

The world economy is going through a transition from monopolistic to competitive market conditions due to majority of the nations joining world trade organisation established in 1995. The impact of such free trade arrangements on performance is yet to be known particularly on agriculture in Kerala in a systematic way. In free market conditions, the major determinant of competitiveness is the productivity of the crops relative to its competitors. From the policy point of view, it is also important to know the sources of productivity so that state may take appropriate actions for maintaining or improving its competitiveness. The objective of the present paper has the following twin objectives. The first one is to understand the factors contributing to the performance of agriculture in Kerala. The second one to examine the factors contributing to the international competitiveness of agricultural commodities traded from Kerala.

The outline of the study is as follows. In the first section, the performance of agriculture is evaluated during the last forty- two years of the regional economy. It also provides the growth rates of the economy and of agriculture corresponding to periods based on endogenously determined breaks points. The second section examines the sources of growth particularly the main determinant, productivity, and its major components using decomposition method pioneered by Dharam Narain. The third section looks at the competitiveness of internationally traded agricultural commodities from Kerala. The final section provides the summary and conclusions of the study.

.The excellent research assistance of V. Jayachnadran is gratefully acknowledged



I

Growth Performance: Agriculture and Overall

The trend in Figure 1 clearly shows that the overall economy is subject to accelerated growth while agriculture sector is either slowing down or stagnating. The trend lines start widening after the 70s. The series is also subject to structural breaks. The standard practice is to identify the breaks visually and test for its statistical validity. But recent developments in econometrics of time series show this method of exogenously determining the breaks has not much scientific validity and is biased. To overcome this limitation, it is suggested that breaks be determined endogenously. This method has been recently applied to the performance of Kerala economy and results relevant for the present analysis is reported[1] in Table 1. While the aggregate economy had three breaks, agriculture had four. The overall growth of the economy is 5.97 % starting from 1988/89 onwards.

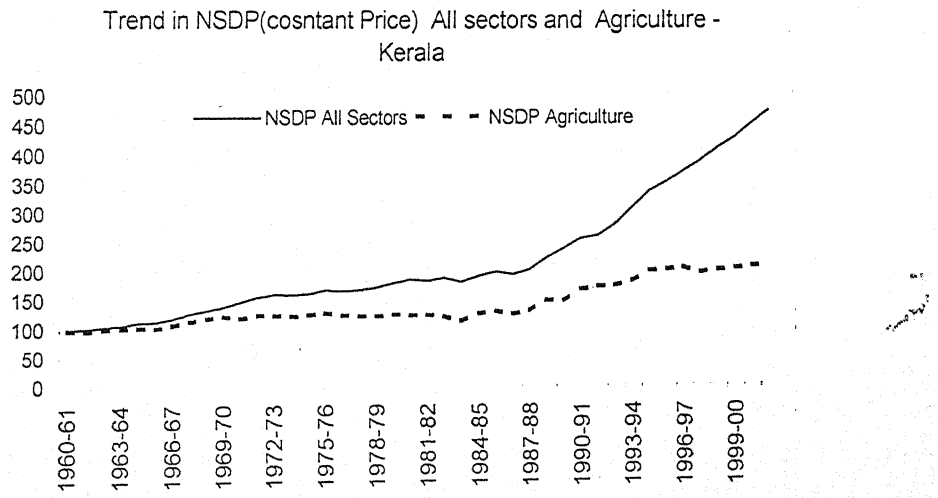
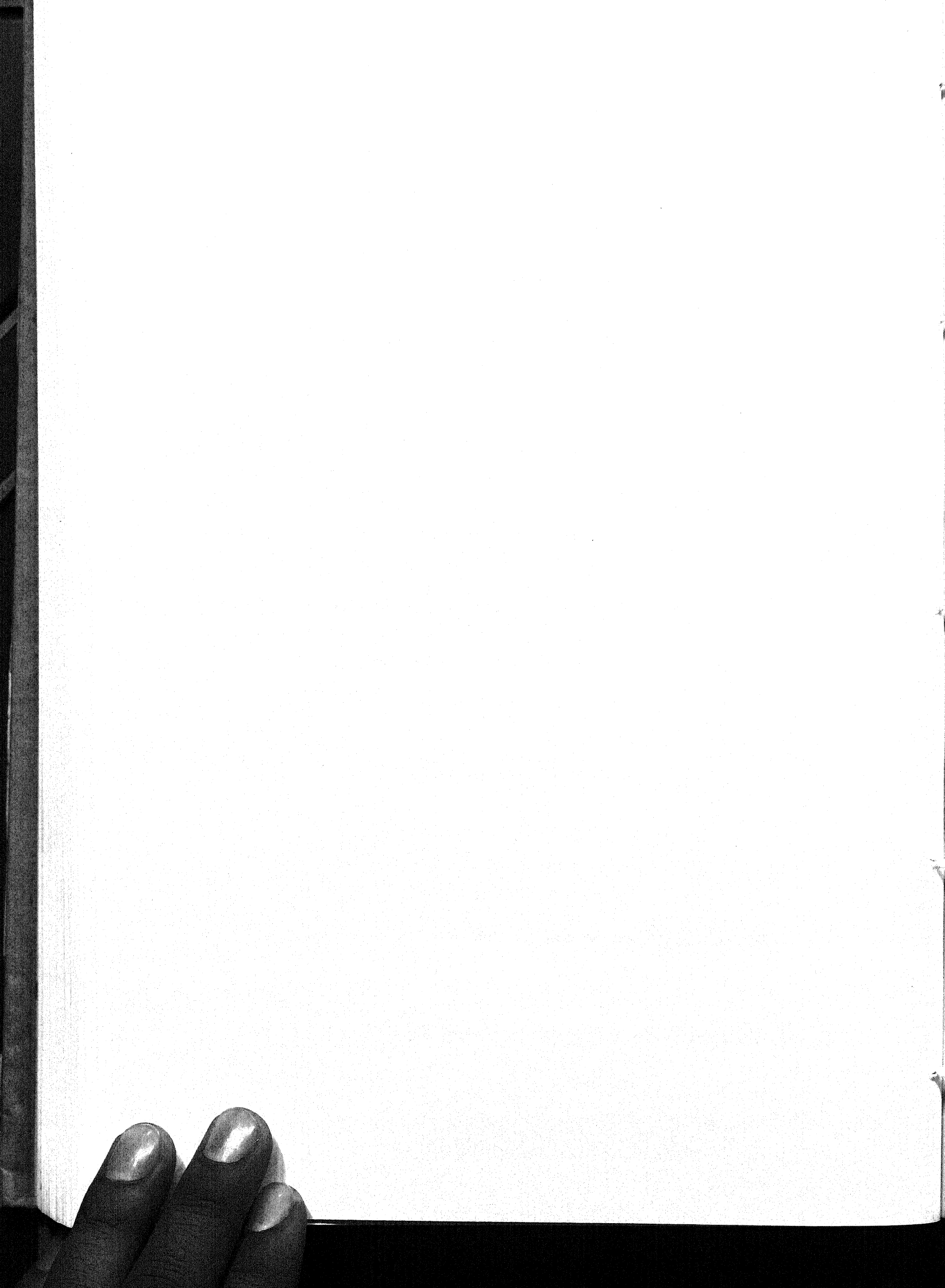


Figure 1 Trend in NSDP All sectors and Agriculture sector - Kerala

[1] See for the detailed methodology, Pushpangadan and Parameswaran (2006).



At the sectoral level, the acceleration is mainly contributed by the service sector (tertiary); both Primary and Secondary sector have slowed down towards the end of the period (90s). The disaggregated break analysis of the primary sector clearly indicates that the growth rate of agriculture towards the end of the period (IVth period) has slowed down to half of its

Table 1. Growth Rates by Periods and by Sectors, (FY 1960/1 - FY 2001/2)

No.	Sector	Period			
		I	II	III	IV
	All sectors	4.49 [60/61-69/70]	2.08 [70/71-87/88]	5.97 [88/89-01/02]	
I	Primary	2.89 [60/61-71/72]	-1.23 [72/73-82/83]	3.6 [83/84-93/94]	1.99 [94/95-01/02]
1	Agriculture	3.39 [60/61-67/68]	0.00 [68/69-82/83]	3.85 [83/84-93/94]	1.91 [94/95-01/02]
2	Forestry and Logging	13.72 [60/61- 66/67]	-2.58 [67/68-80/81]	-13.72 [81/82-90/91]	5.76 [91/92-01/02]
3	Fishing	7.13 [60/61-68/69]	-0.46# [69/70-89/90]	3.18 [90/91-01/02]	
4	Mining and Quarrying	-3.32 [60/61-75/76]	8.65 [76/77-87/88]	6.38 [88/89-01/02]	
II	Secondary	7.39 [60/61–69/70]	3.37 [70/71–85/86]	6.10 [86/87-93/94]	5.59 [94/95-01/02]
III	Tertiary	5.57 [60/61-69/70]	3.75 [70/71- 82/83]	4.43 [83/84-91/92]	7.97 [92/93-01/02]

Source: CSO, National Accounts, various issues

growth in the previous period (III[rd] period). A major factor that affects growth rate of agriculture is the productivity since the cropped area has already reached its limit. We need to examine the sources of productivity for understanding the slowdown in growth. This aspect is examined in the next section.

II

Sources of Productivity Growth

Dharm Narain (DN) used decomposition method for understanding the sources of productivity growth in Indian agriculture[2]. The same methodology is pursued here as well. For this purpose, DN starts with the index of productivity (the gross value of agriculture output in constant prices per hectare of cropped area) as defined in (1).

$$I_t = \frac{\sum_i C_{it} Y_{it} P_{i0}}{\sum_i C_{i0} Y_{i0} P_{i0}} \qquad \Lambda\ \Lambda\ \Lambda\ \Lambda\ (1)$$

where Ci is the proportion of cropped area of i[th] crop in the total cropped area, Yi is the yield per unit of cropped area and Pi is the price of i[th] crop; the subscripts "t' and '0' indicate the current and base year values respectively of the variables in the specification. The relationship in (1) can be decomposed into area effect, pure yield effect and yield-area interaction effect only. In order to capture the location shift effect on yield change, the formula in (1) should contain region wise acreage and yield. This is introduced as shown below.

$$Y_{it} = \frac{\sum_s A_{ist} Y_{ist}}{\sum_s A_{ist}} = \frac{\sum_s A_{ist} Y_{ist}}{\sum_i \sum_s A_{ist}} \times \frac{\sum_i \sum_s A_{ist}}{\sum_s A_{ist}} = \sum_s C_{ist} Y_{ist} \frac{\sum_i \sum_s A_{ist}}{\sum_s A_{ist}}$$

If there are 's' districts, then the aggregate yield and cropped area can be decomposed at the district level as follows.

---

[2] See Minhas and Vaidyanathan (1965, Narain (1988) and Pushpangadan (2005)

Where A_{ist} = area under the i[th] crop in the s[th] district in the t[th] year, Y_{ist} = yield of the i[th] crop in the s[th] district in the t[th] year, and $C_{ist} = A_{ist} / \sum_i \sum_s A_{ist}$

Since

$$C_{it} = \frac{\sum_s A_{ist}}{\sum_i \sum_s A_{ist}}$$

$$C_{it} Y_{it} = \sum_s C_{ist} Y_{ist}$$

Similarly

$$C_{i0} Y_{i0} = \sum_s C_{is0} Y_{is0}$$

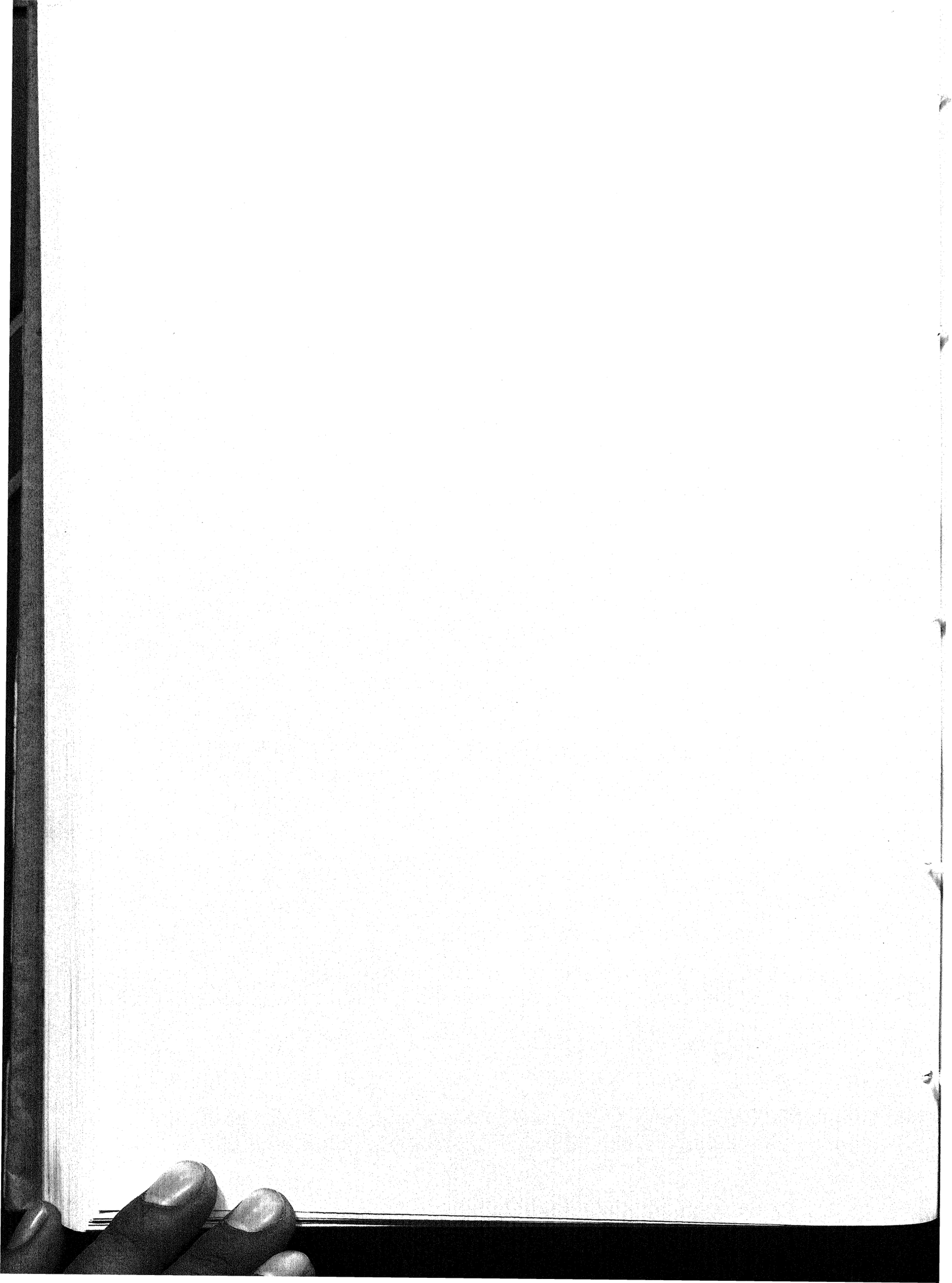
Substituting $\sum_s C_{ist} Y_{ist}$ and $\sum_s C_{is0} Y_{is0}$ respectively for $C_{it} Y_{it}$ and $C_{i0} Y_{i0}$ in (1) and expressing them as change from base year values, we have

$$I_t = \frac{\sum_i \left\{ \sum_s C_{ist} Y_{ist} P_{i0} \right\}}{\sum_i \left\{ \sum_s C_{is0} Y_{is0} P_{is0} \right\}} = \frac{\sum_i \sum_s \{(C_{ist} - C_{is0}) + C_{is0}\}\{(Y_{ist} - Y_{is0}) + Y_{is0}\} P_{i0}}{\sum_i \sum_s C_{is0} Y_{is0} P_{i0}} \qquad \Lambda\Lambda\ (2)$$

Expressing gross cropped area in the 's[th]' district as a proportion of the aggregate total cropped area of the i[th] crop for the current and base year period, we have

$$C_{ist} = \frac{A_{ist}}{\sum_i \sum_s A_{ist}} \times \frac{\sum_s A_{ist}}{\sum_s A_{ist}} = d_{ist} C_{it} \qquad \Lambda\Lambda\Lambda\Lambda\Lambda\ (3a)$$

where $d_{ist} = \frac{A_{ist}}{\sum_s A_{ist}}$ = area under the i[th] crop in the s[th] district as proportion of the total area under the i[th] crop in the t[th] year in the state,



Similarly, $C_{is0} = d_{is0} C_{i0}$ $\Lambda\Lambda\Lambda\Lambda\Lambda\Lambda$ (3*b*)

Substituting 3(a) and 3(b) in (2) and simplifying[3],

$$I_t = 1 + \{\sum_i \sum_s C_{i0} d_{is0} (Y_{ist} - Y_{is0}) P_{i0} + \sum_i \sum_s C_{i0} (d_{ist} - d_{is0}) Y_{is0} P_{i0}$$
$$+ \sum_i \sum_s (C_{it} - C_{i0}) d_{is0} Y_{is0} P_{i0}$$
$$+ \sum_i \sum_s (C_{it} - C_{i0})(d_{ist} - d_{is0}) Y_{is0} P_{i0}$$
$$+ \sum_i \sum_s (C_{it} - C_{i0}) d_{is0} (Y_{ist} - Y_{is0}) P_{i0}$$
$$+ \sum_i \sum_s (C_{it} - C_{i0})(d_{ist} - d_{is0})(Y_{ist} - Y_{is0}) P_{i0}$$
$$+ \sum_i \sum_s C_{i0} (d_{ist} - d_{is0})(Y_{ist} - Y_{is0}) P_{i0} \} / \sum_i \sum_s C_{i0} d_{is0} Y_{is0} P_{i0} \quad \Lambda\Lambda\Lambda\Lambda (4)$$

he terms in the numerator of (4) gives the major components and its interaction effects of yield change for the present analysis. It may be noted that the first three terms measure the pure effects of yield, location and cropping pattern. The remaining four terms capture the interaction effects of area, yield and location simultaneously. However, Narain (1988) simplifies all the three interaction effects containing the area change into a single cropping pattern effect as given by the formula below[4].

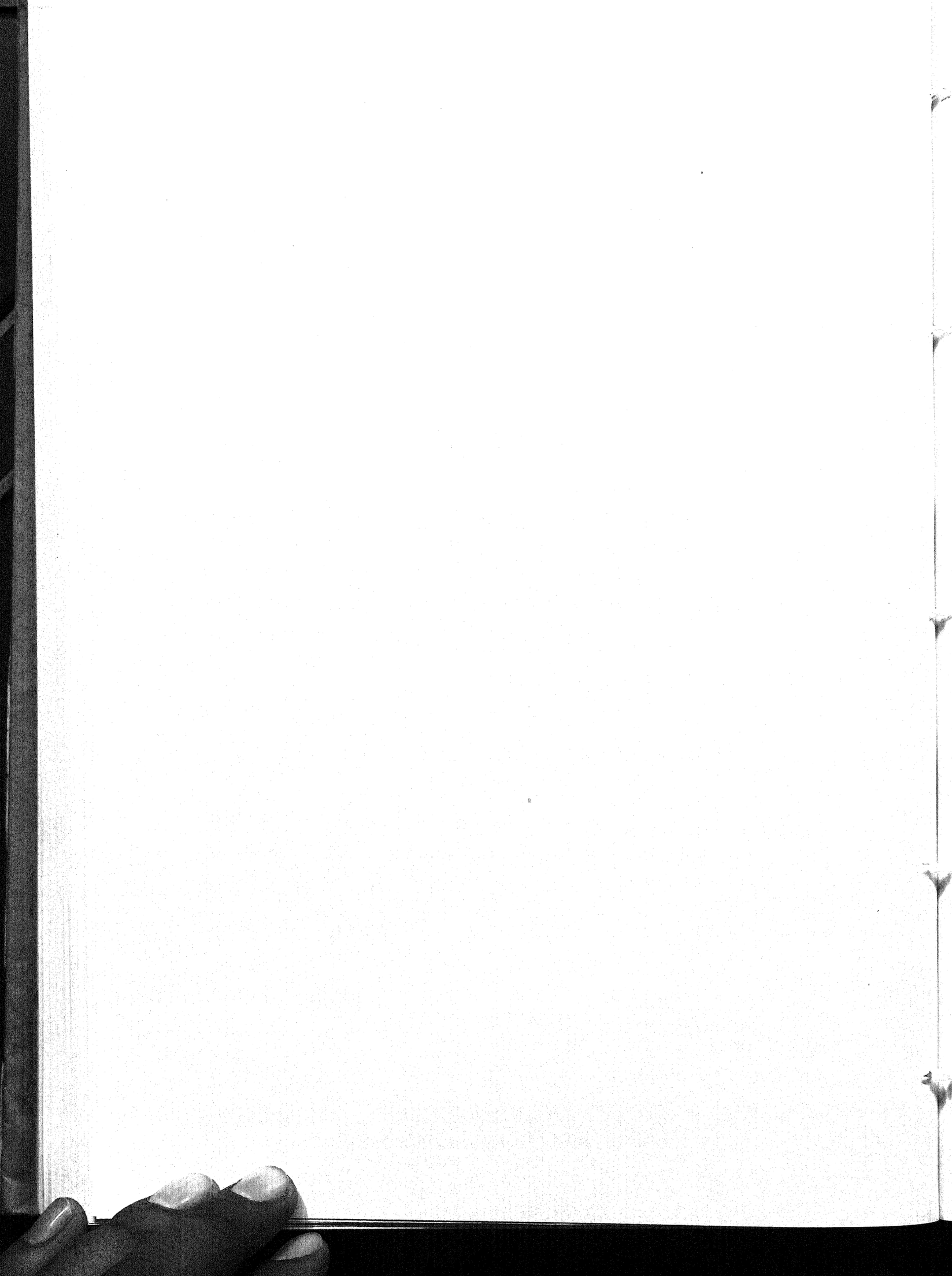
$$\sum_i (C_{it} - C_{i0})(Y_{it} - Y_{i0}) P_{i0}$$

We have taken the same formula as the cropping pattern interaction effect for the present analysis as well. It may be noted that the last term in (4) is taken as the location interaction effect.

---

[3] For the detailed derivations, see Narain (1988); pp.132-33.

[4] Ibid, p.135 for the proof.



The Results

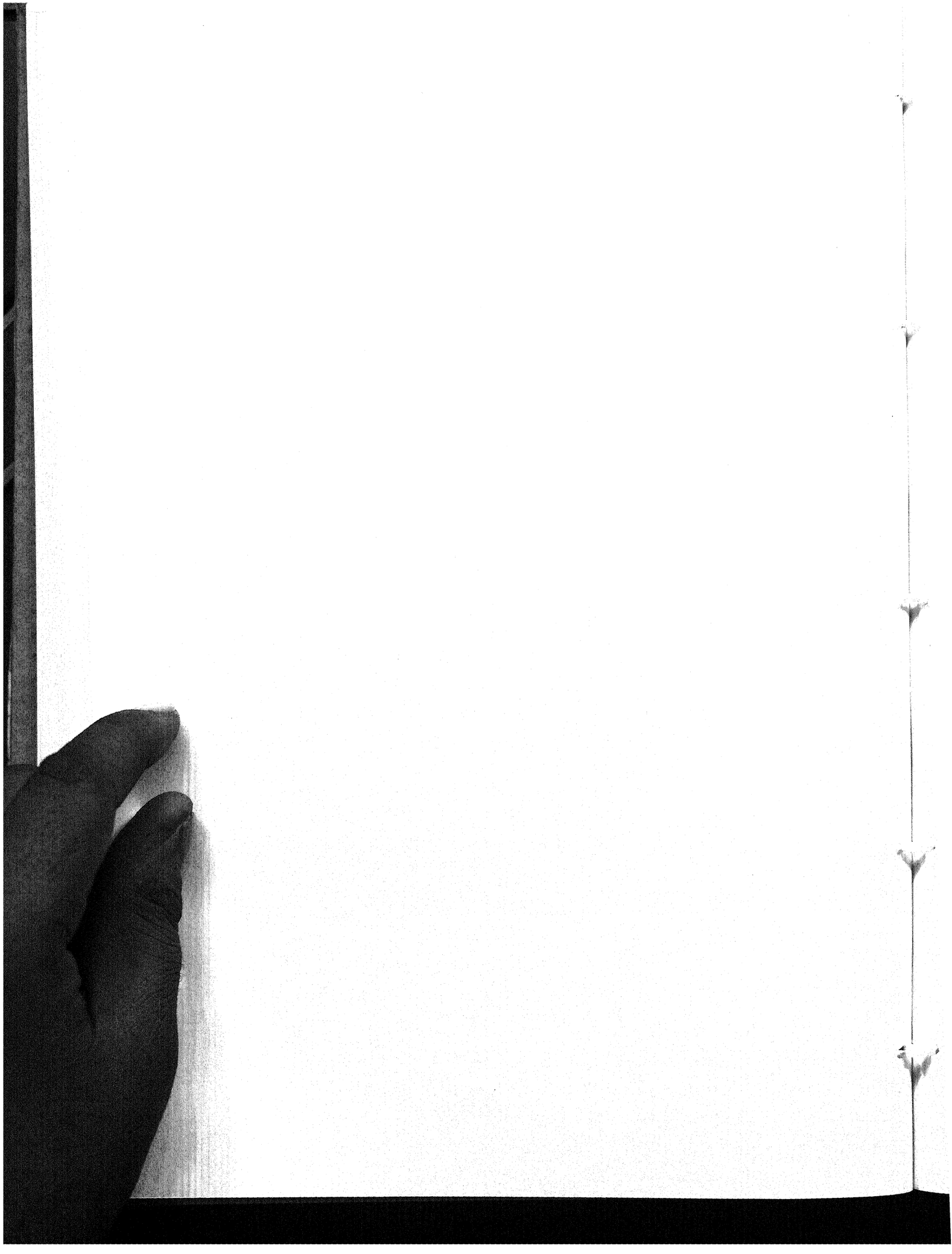
We have applied the decomposition formula in (4) to obtain the sources of growth in productivity change in Kerala's agriculture for the period, 1985/86-2001/2. The middle point is taken as 1994/5, which also overlaps with 1995, the year in which India has become a member of WTO. The choice of the crops and the period of analysis are mainly dictated by the availability of data at the district level. Even though, Government of Kerala have published area under 18 principal crops in Kerala in 1985/86, we include only 16 of them covering 85 % of gross cropped area for the analysis. Since the data relating to the fourteen districts (including the newly formed ones, Kasargodu and Pathanamthitta) are available only from 1985/6 onwards, the same year is taken as the starting point of the analysis. The base year is taken as 2001/2. The period wise analysis of the productivity change is the same as that given by the endogenously determined break points reported in Table 1. The gross value of yield per hectare of gross cropped area in constant prices has increased at a decreasing rate during the period, 1985/6 - 2001/2. To be more specific, the yield growth rate is 2.9% prior to WTO (World Trade Organisation) membership (1985/6-1994/5) and has slowed down to 1.9 % in the post-WTO period (1994/5-2001/2). The absolute change in the value of yield per hectare of gross cropped area is decomposed into its components and the results are reported in Table 2.

The contribution of pure yield to the change in productivity prior to pre-WTO period is 83 % and cropping pattern effect 14.4 %. In the case of cropping pattern effect, it is mainly the interaction effect that has contributed to the higher yield effect. In the post-WTO period, the change in yield due to cropping effect, where the pure effect is double that of the interaction effect. This would mean that the change in yield is due to the shifting of acreage from lower value crops to higher value crops in the post WTO period. Another interesting observation is the drastic decline in pure yield, about 1/3 after 1994/5. In other words, the slow down in yield is mainly due to the pure yield effect. It is also worth mentioning that the location effect has not played any significant role in changing productivity during the entire period of analysis. The reasons may be due to the

Table 2: Absolute Changes in Productivity per Hectare (Rupees)

Period	Cropping pattern effect			Locational effect			Pure yield effect	Total
	Pure	Interaction	Total	Pure	Interaction	Total		
1985-86	72.24 (-0.8)	-1380.06 (15.2)	-1307.82 (14.4)	-338.14 (3.7)	109.48 (-1.2)	-228.7 (2.5)	-7565.88 (83.1)	-9102.37
1994-95	-1659.36 (48.1)	-785.83 (22.8)	-2445.19 (70.9)	-184.74 (5.3)	113.74 (-3.3)	-71.00 (2.1)	-932.69 (27.0)	-3448.88
2001-02	0	0	0	0	0	0	0	0

Source: Department of Economics and Statistics, Govt. of Kerala, Varuous publications
Note: The figures in the brackets are percentages of components contributing to the change in yield.



lack of diffusion effort at the district level or the absence of region-specific technology to cope up with different agro-climatic conditions of various districts. The analysis clearly points out to the need for yield augmenting technology for different agro-climatic zones in the state. Let us now examine the impact of declining productivity on the competitiveness of export crops form the state. This is examined in the next section.

III

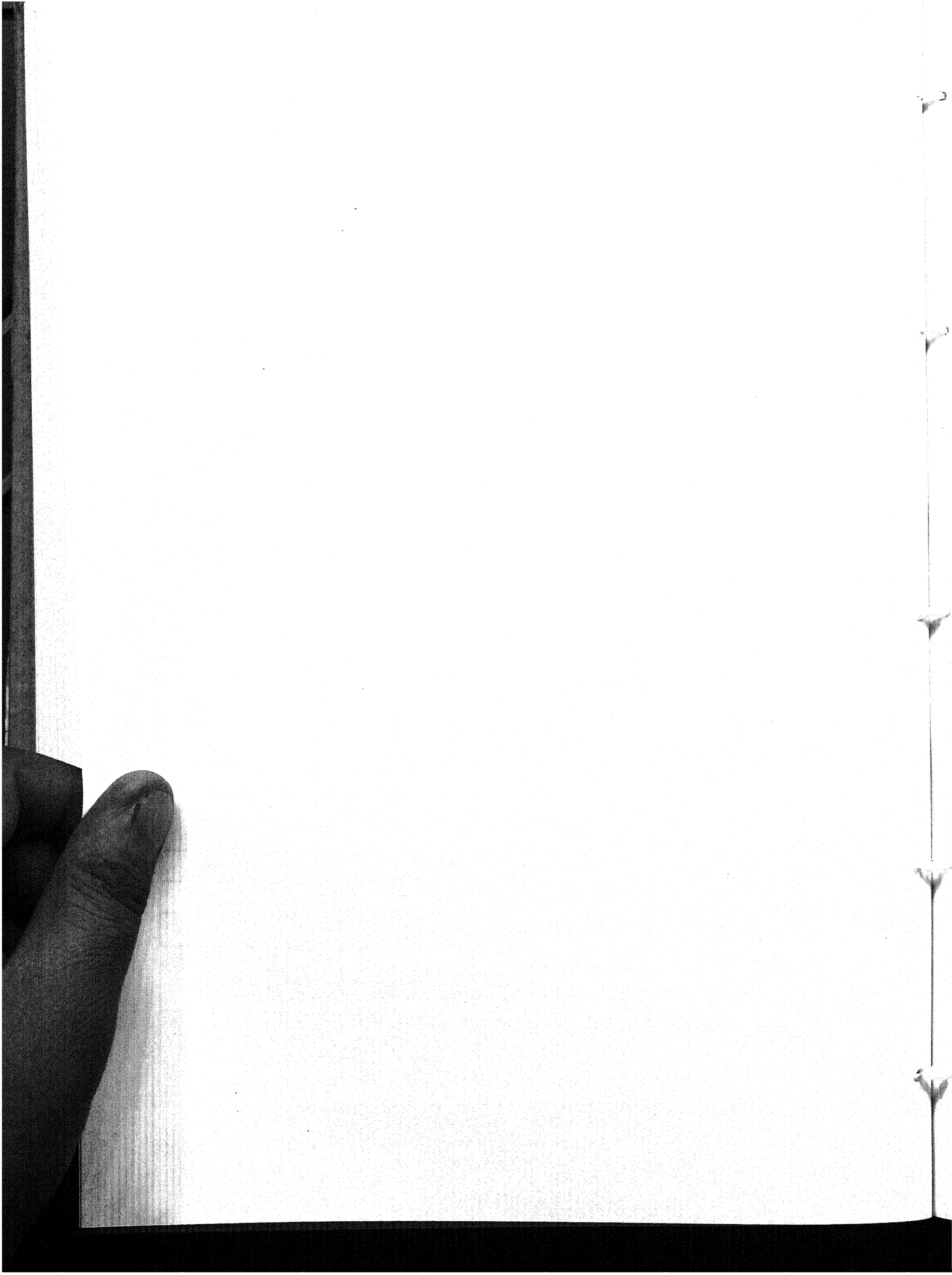
The impact of declining productivity has implication for the competitiveness of our exports. This is examined for three major cash crops (Coconut, Pepper and Rubber), that are traded internationally.

The competitive position of a country in the production of a crop is measured by the productivity of the crop relative to the average productivity of all the producers. In other words, if the relative productivity is greater than 100, then yield rate is higher the global average. Otherwise, it is below the global average. The ratios are reported in Table 3.

Table 3: International Competitiveness of Major Export Crops, Kerala, 1995-2003.

	Coconut			Pepper			Rubber		
	1995	2003	% Change	1995	2003	% Change	1995	2003	% Change
Brazil	-	-		277	319	15.2	-	-	
China	-	-		-	-		122	143	17.2
India	114	112	-1.8	46	36	-21.7	140	178	27.1
Indonesia	120	97	-19.2	134	93	-30.6	77	66	-14.3
Malaysia	-	-		234	229	-2.1	85	54	-36.5
Philippines	87	94	8.0		-	-	-	-	
Sri Lanka	102	97	-4.9	90	67	25.6	-	-	
Thailand	90	90	0	-	-		157	168	7.0
Vietnam	-	-		211	213	0.9	-	-	

Source: George (2006); Tables, 3.8, 3.17 and 3.26.

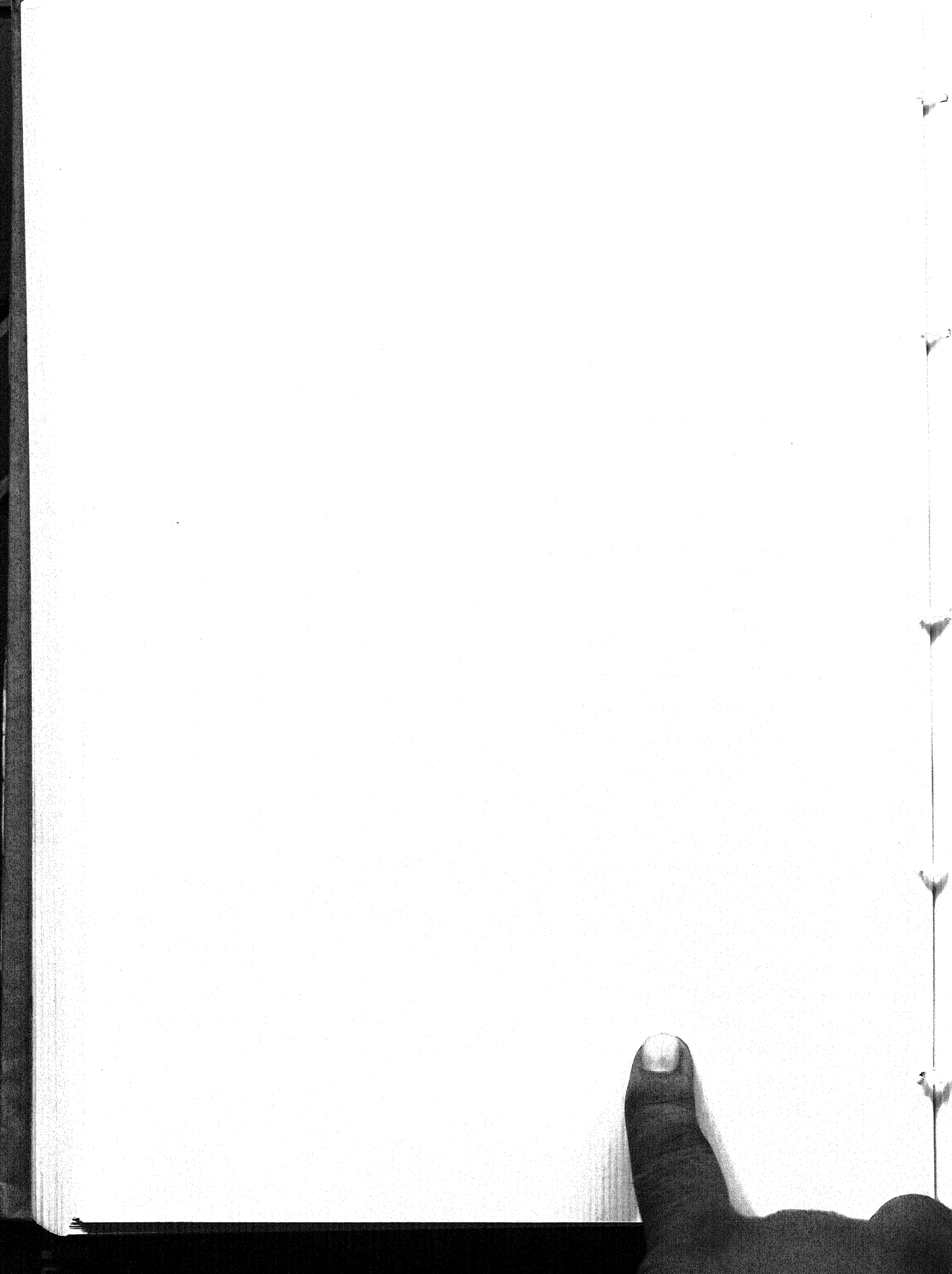


Of three crops, only in the case of rubber the relative has not declined during the post-WTO period. In the case of coconut, the relative productivity is the highest for India in 2003. But the gap is narrowing down very fast. India has the least advantage in the production of pepper, which is only 15.7 % of Malaysia, 11.3 % of Brazil and 16.7 % of Vietnam, in 2003. In the case of rubber we are number on in the world, but China and Thailand are reaching very close to our productivity. Therefore, these countries can take over the market unless we reverse the general slow down in the productivity as observed in the decomposition analysis.

The analysis clearly indicates that the growth can be revived only if a second wave of green revolution be generated and diffused. This involves huge public expenditure in R & D on location-specific crops and cropping system in the dry lands, hills, tribal and other marginal areas[5]. An important component such public investment should be the application of biotechnology. Knowledge thus created needs to be vigorously diffused with the help of extension network available across the regions using developments in Information and Communication Technology. Let us see the public investment in agriculture during the period. The state-wise growth rates in public investment for the period, 1993/4-2000, indicate that no significant trend for the state of Kerala (Shyjan, 2003). This explains why the productivity in agriculture have slowed down during the period. This also reduced the competitiveness of our agricultural exports. The major hurdle is to pump in public funds so that growth can be revived in Kerala's agriculture in order to withstand international competition. Several possibilities exist to reverse the trend in investment in agriculture. First one is to allocate input subsidies in agriculture efficiently and equitably. The surplus, thus generated, should be ploughed back in yield increasing infrastructure facilities and diffusion activities. Yet another way, more promising, is to allocate funds earmarked for rural employment generation only to productivity-augmenting activities in agriculture as far as possible. Other innovative ways of augmenting rural investment need to be formulated for the revival of growth in agriculture. This is the most challenging problem faced by the policy makers in the region.

---

[5] See the preface by C.H.H. Rao for the Millennium studies in Indian Agriculture, Bhalla (2004)



IV

Summary and Conclusions

The performance of the regional economy indicates accelerated growth of net state domestic product in the 90s comparable to that of all India. But the trends in major sectors of the region do not follow the same pattern; agriculture and manufacturing have started slowing down while the service sectors maintain its accelerated growth since 90s. The period wise analysis as determined by endogenous break points show that agriculture sector is slowing down from 1994/5 onwards. Analysis of the sources of growth decline attributes it to the productivity decline. The productivity has declined from 2.8 % during the period, 1985/6 –1994/95, to 1.9 % in 1994/95-2001/2. To understand further the sources of yield change, we have decomposed it to cropping pattern effect, location effect and pure yield effect using Dharam Narain's methodology. The results show that decline in productivity is mainly due to pure yield effect. The location effect remains the same during the period. The only positive factor is the cropping pattern effect. The policy implication is straightforward; only way to put growth back in agriculture is to evolve yield increasing production technology particularly suited to various agro-climatic regions of the state.

The slowing down of productivity also affects the competitiveness of agricultural exports. It indicates our comparative advantage fast disappearing in Coconut and Rubber. In the case of pepper, we have the lowest productivity during the period 1995-2003. In fact, India can be wiped out from the international market by Vietnam unless we improve our yield rate by three to four times of our present yield.

The analysis points to the urgent need for public investment in yield augmenting activities in agriculture for making our products internationally competitive under WTO (world trade organisation) regime.



References

Bhalla, G.S., (2004), Globalisation and Indian Agriculture, Volume 19, State of the Indian Farmer: A Millennium Study, (Ministry of Agriculture, Government of India and Academic Foundation, New Delhi).

George, P.S., (2005), Globalisation and Agricultural Transition in Kerala, Centre for Development Studies, Thiruvananthapuram (mimoe).

GOK, Statistics for Planning, (various issues). Department of Economics and Statistics, Trivandrum, Kerala.

GOK, Agricultural Statistics, (various issues). Department of Economics and Statistics, Trivandrum, Kerala.

GOK, Price Statistics, (various issues). Department of Economics and Statistics, Trivandrum, Kerala.

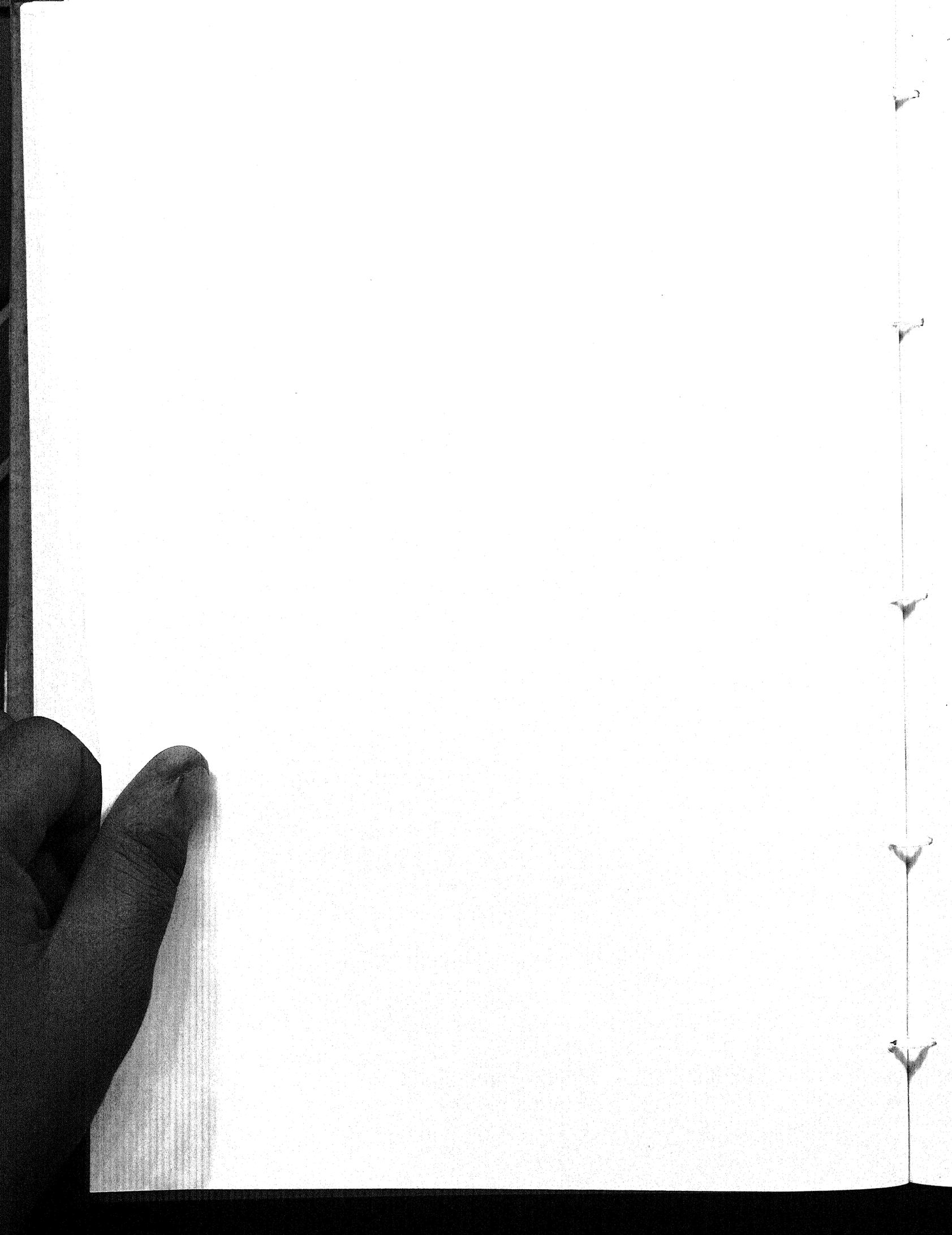
Minhas, B.S. and A. Vaidyanathan,(1965), 'Growth of Crop Output in India: 1951/54 to 1958/61, An Analysis by Component Elements', Journal of the Indian Society of Agricultural Statistics, Vol.VII, No.2.

Narain, D., (1988), "Growth of Productivity in Indian Agriculture", in K.N. Raj, Amartya Sen and C.H. Hanumantha Rao, (ed.), Studies on Indian Agriculture (Oxford University Press, Madras): pp.129-81.

Pushpangadan, K., and M. Parameswaran, (2006), Growth Acceleration in Kerala: Is It Service-led or not ?, Centre for Development Studies, Thiruvananthapuram, (mimeo.)

Pushpangadan. K., (2005). Agricultural policy and Performance in India: A Post-reform Analysis, Fourth Development Convention Proceedings, Centre for Economic and Social Studies, Hyderabad.

Shyjan, D., (2003), Public Investment and Agricultural Productivity: The Case of Food grains in India, JNU M-Phil thesis, Centre for Development Studies, Thiruvananthapuram.



THE AGRARIAN SITUATION IN TAMIL NADU

By

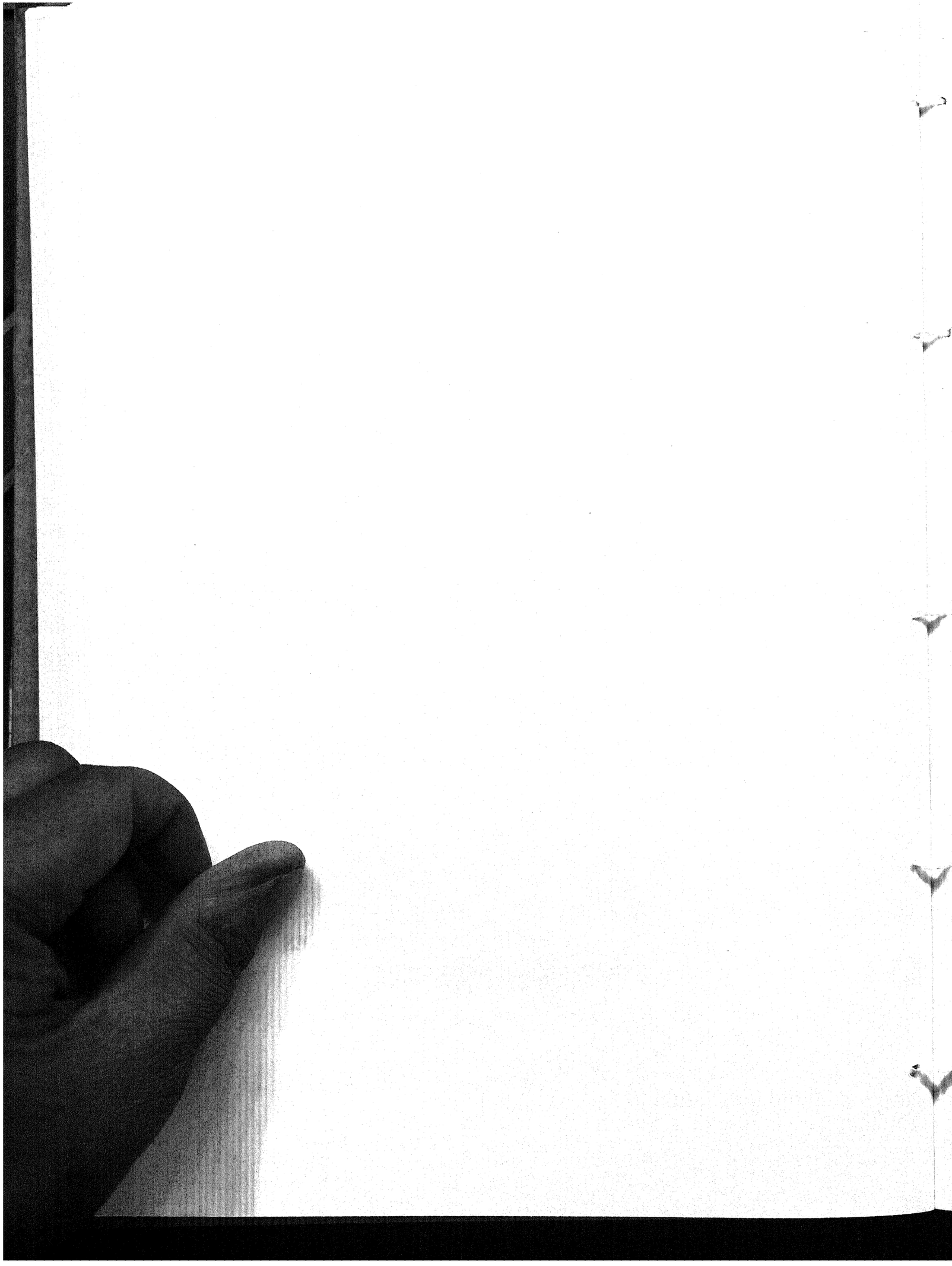
J. JEYARANJAN
K. NAGARAJ

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



THE AGRARIAN SITUATION IN TAMILNADU

J. Jeyaranjan, IDA & K. Nagaraj, MIDS

Going by the level of yield or the extent of use of modern inputs, the agricultural sector in Tamil Nadu is relatively more modernised compared to most of the states in the country. It has a relatively high level of irrigation, and in terms of ground-water utilisation – as given by the number of pumpsets per unit of cultivated area – it is ahead of even Punjab and Haryana; it also has a relatively high level of fertiliser use [Table 1]. It also has a high level of yield, next only to Kerala among the major states. This is in part due to a relatively high level of commercialisation of its cropping pattern, an issue we shall deal with in some detail later.

Table-1: Some Characteristics of the Agricultural Sector in Tamil Nadu

Characterisitcs	Reference year / period	Tamil Nadu	India	States which are ahead of Tamil Nadu.
Average value of yield (Rs / Hectare)	1992-95	14074	7388	Only Kerala with a yield of Rs 15626 per hectare is ahead of Tamil Nadu.
Percentage of gross cropped area (GCA) irrigated	1992-95	47.9	35.7	Punjab (94.6), Haryana (77.1), Uttar Pradesh (62.3) and West Bengal (54.3).
Cropping intensity (GCA/NSA)	1992-95	1.27	1.30	Punjab, Himachal Pradesh, Haryana, West Bengal, Orissa, J and K, U.P, Bihar and Kerala do better than Tamil Nadu.
Consumption of fertilisers (Kgs / ha)	1992-95	141	89	Punjab (297), Haryana (191) and Andhra Pradesh (150) do better than Tamil Nadu.
Number of pumpsets(per'oooh a)	1987	194	65	Tamil Nadu is ahead of all other states in this.
Number of tractors (per 'oooha)	1987	2.7	11.7	Tamil Nadu has the lowest level of tractorisation in the country.
Annual compound growth rate of agricultural output (percent)	1963-65 to 1992-95	2.36	2.71	Punjab (4.89), Haryana (4.14), Rajasthan (3.56), Karnataka (0.04), West Bengal (2.99), M.P (2.83), U.P (2.27), J and K (2.70) and A.P (2.68)

Source: Bhalla and Singh (1997).

Growth Performance of the Agricultural Sector

But the growth performance of the agricultural sector in the state – just as the growth performance of its domestic product – appears to be just about average. The annual compound growth rate of the value of agricultural output (in constant prices) is just about 2.4 percent per annum between the early sixties and early nineties in the state, which is even lower than the corresponding all-India rate of about 2.7 percent per annum. In fact, in a comparison among the seventeen major states in the country, Tamil Nadu ranks tenth in this regard.

Thus, a relatively higher level of modernisation, and sluggishness seem to be two important characteristics of the agricultural sector in Tamil Nadu. The sluggish growth of the agricultural sector noted here is in line with the phenomenon of sluggish growth of the

primary sector income in the state which grew at a low to moderate rate, with a moderate level of fluctuation, from around the early sixties to early seventies; and it was virtually stagnant, with high levels of instability from around the mid-seventies to early eighties; and a recovery with moderate fluctuations set in from around the mid-eighties to early nineties. The scenario appears to be somewhat similar even for the agricultural sector. This is clear from Table 2, which gives the indices for area, yield and production in the agricultural sector in the state from the early sixties to early nineties, and from Table 4 which summarises the growth performance of this sector over this period. These tables also point out that there has been a steady decline in the gross cropped area in the state from the mid or late seventies onwards; and hence the recovery witnessed in agricultural production from around the mid-eighties is largely attributable to productivity growth, but a setback to this recovery occurred after that.

Table-2: Index Numbers for Area, Yield and Production in the Agricultural Sector in Tamil Nadu, 1962-63 to 1990-91:

(Base: Triennium ending 1961-62 = 100)

Year	Area	Yield	Production	Year	Area	Yield	Production
1962-63	101.9	103.7	105.9	1977-78	108.0	125.1	155.1
1963-64	101.1	102.0	103.4	1978-79	107.2	128.6	160.6
1964-65	100.6	104.4	105.4	1979-80	108.0	122.5	156.4
1965-66	97.5	98.4	97.8	1980-81	88.9	112.7	128.1
1966-67	105.1	101.3	102.4	1981-82	95.7	130.1	154.8
1967-68	99.5	102.6	103.7	1982-83	82.5	121.4	119.0
1968-69	94.8	108.4	102.5	1983-84	96.0	113.6	128.0
1969-70	100.0	101.3	114.3	1984-85	98.3	122.3	152.6
1970-71	102.2	109.6	126.7	1985-86	94.8	134.0	164.2
1971-72	106.1	114.5	135.7	1986-87	88.0	154.1	158.3
1972-73	107.6	114.2	139.2	1987-88	91.0	141.6	166.9
1973-74	106.0	122.9	150.2	1988-89	86.6	139.6	166.9
1974-75	93.3	102.9	113.0	1989-90	92.1	145.6	182.0
1975-76	101.3	124.8	140.8	1990-91	86.2	143.2	173.5
1976-77	99.0	119.6	134.0	-	-	-	-

Source: Various issues of Economic Appraisal, Government of Tamil Nadu. While the Appraisals give the series for the sixties, seventies and the eighties with different base years, we have constructed this series with a single base year using appropriate conversion ratios.

The setback in agricultural sector in the recent past is clearly evident from the new series index on agricultural production and productivity. There is an overall decline and it is more acute in terms of productivity both for food and non-food crops. Area losses are experienced both by food and non-food crops. Recovery of the sector is nowhere in sight and hence the sector needs urgent attention from the state (Table 3).

Table-3: Index Number Of Area, Yield And Production Of Crops: Tamil Nadu (New Series)

Year	Foodcrops			Non-foodcrops			All crops		
	A	Y	P	A	Y	P	A	Y	P
1994-95	80.04	162.75	137.60	142.25	125.01	187.51	99.42	138.31	162.98
1995-96	69.46	130.62	96.54	133.63	111.72	162.96	89.45	84.79	130.20
1996-97	74.04	129.25	104.85	118.03	106.79	140.92	87.74	115.16	123.18
1997-98	75.51	146.80	122.88	128.81	118.59	164.48	92.12	128.99	144.02

1998-99	76.10	171.02	144.37	120.00	118.00	170.45	89.77	137.14	157.62
1999-00	86.47	132.17	154.30	113.12	137.79	141.29	92.71	133.10	151.90
2000-01	93.64	105.40	116.29	75.96	100.01	95.82	88.41	104.37	111.89
2001-02	92.59	100.29	110.54	73.16	93.96	89.69	86.84	99.07	106.06

Source: Directorate of Economics and Statistics, Chennai-6.

Table-4: Growth Performance of the Agricultural Sector in Tamil Nadu:

Item	*1962-63 to 1973-74*					
	1962 / 63 to 68 / 69		1969 / 70 to 73 / 74		1962 / 63 to 73 / 74	
	Annual compound growth rate (%)	Average deviation from trend (%)	Annual compound growth rate (%)	Average deviation from trend (%)	Annual compound growth rate (%)	Average deviation from trend (%)
Area	-0.3	2.1	3.8	1.4	0.6	1.8
Yield	0.2	2.2	5.0	3.7	1.4	2.9
Production	-0.5	2.4	11.2	3.2	3.4	2.8
1974-75 to 1990-91						
Item	1974 / 75 to 1983 / 84		1984 / 85 to 1990 / 91		1962 / 63 to 1990 / 91	
	Annual compound growth rate (%)	Average deviation from trend (%)	Annual compound growth rate (%)	Average deviation from trend (%)	Annual compound growth rate (%)	Average deviation from trend (%)
Area	-1.0	5.4	-1.5	2.5	-0.5	3.3
Yield	0.7	4.6	1.1	2.8	1.2	3.2
Production	0.5	8.5	2.6	3.1	2.0	5.0

Note: 1. In calculating the annual compound growth rate, the averages for the trienniums at the beginning and the end of each period are considered.

2. The annual average percentage deviation from the trend given by the three-year moving averages is used as a measure of fluctuation of the series.

We would like to register a caveat at this stage. The data on the index numbers given in Tables 2 & 3 appear to be of very poor quality. The indices for area and yield more often than not, do not 'add' to production indices, and hence, so do the growth rates summarised in Table 2. Given this, we have used these data – the only ones we could lay our hands on, on the important aspect of overall performance of the agricultural sector – only to infer the broad generalisations, stated above, which are in line with generalisations arrived at on the basis of other, more reliable, sets of data. While one such set of data refers to the series on primary sector income, another such set of more reliable data, refers to area, yield and production figures for the major individual crops in the state. Analysis of this set of data will also help us construct a picture of the growth performance of the major crops over time in the state, and hence, the changes, if any, in the composition of the agricultural sector over time in the state.

Growth Performance of the Major Crops

The growth performance of the major crops from the early sixties to mid-nineties in the state is summarised in Table 5 below. The crops covered here – rice, coarse cereals, pulses, groundnut, cotton and sugarcane – account for close to 80 percent of the gross cropped area in the state today. The residue, given as 'other crops' in the Table consist of non-foodgrains like contiments and spices, plantation crops, fruits and vegetables etc.

Table-5: Growth Performance of Major Crops in Tamil Nadu

Crop		Item	1960-61 to 1973-74					
			1960/61 to 1968/69		1969/70 to 1973/74		1960/61 to 1973/74	
			ACGR (%)	ADT (%)	ACGR (%)	ADT (%)	ACGR (%)	ADT (%)
Food-grains	Rice	Area	neg.	2.8	4.4	2.4	0.6	2.6
		Yield	-0.4	1.8	8.7	5.2	2.7	3.1
		Prod.	-0.4	3.9	13.1	6.5	3.3	4.9
	Coarse cereals	Area	-1.6	1.3	-5.3	1.8	-1.4	1.5
		Yield	-0.6	2.3	3.2	4.5	0.2	3.1
		Prod.	-2.1	3.1	-2.5	4.9	-1.2	3.8
	Pulses	Area	1.1	2.0	12.4	5.3	3.5	3.3
		Yield	-1.0	1.6	7.1	4.9	1.2	2.6
		Prod.	0.2	2.5	20.4	6.8	4.8	4.2
	All food-grains	Area	-0.6	1.8	0.3	1.6	0.1	1.7
		Yield	-0.4	1.8	4.2	4.4	2.1	2.8
		Prod.	-1.0	3.6	4.5	5.0	2.2	4.1

Crop		Item	1974/75 to 1983/84		1984/85 to 1995/96		1960/61 to 1995/96	
			ACGR (%)	ADT (%)	ACGR (%)	ADT (%)	ACGR (%)	ADT (%)
Food-grains	Rice	Area	-0.8	9.7	0.1	3.3	-0.4	4.9
		Yield	1.4	7.3	3.3	2.1	2.4	4.0
		Prod.	0.6	15.7	3.5	3.2	2.0	7.5
	Coarse cereals	Area	-3.1	6.1	-4.3	2.5	-2.2	3.2
		Yield	1.0	7.7	2.5	2.9	1.3	4.4
		Prod.	-2.2	13.1	-1.9	4.2	-1.0	6.6
	Pulses	Area	3.5	5.4	0.9	7.4	1.9	5.3
		Yield	2.6	4.7	1.2	8.4	1.4	5.1
		Prod.	6.3	9.3	2.0	10.3	3.3	7.7
	All food-grains	Area	-1.1	6.9	-1.1	2.6	-0.7	3.5
		Yield	1.2	8.1	3.6	2.7	2.1	4.4
		Prod.	0.1	14.2	2.5	2.9	1.4	6.7

Crop		Item	1960-61 to 1973-74					
			1960/61 to 68/69		1969/70 to 1973/74		1960/61 to 73/74	
			ACGR (%)	ADT (%)	ACGR (%)	ADT (%)	ACGR (%)	ADT (%)
Non-food-grains	Groundnut	Area	1.7	2.5	4.9	4.4	1.9	3.2
		Yield	-5.6	2.5	4.8	5.8	-1.0	3.8
		Prod.	-3.9	3.6	9.5	10.1	0.8	6.1
	Cotton	Area	-4.5	2.5	0.5	2.7	-2.2	2.6
		Yield	1.0	4.1	-0.2	6.0	2.2	4.8
		Prod.	-3.5	5.8	0.5	6.3	neg.	6.0
	Sugarcane	Area	9.6	10.9	7.6	7.9	7.0	9.8
		Yield	0.7	2.0	5.9	3.4	1.5	2.5
		Prod.	10.4	11.9	14.2	10.3	8.7	11.3
	Others	Area	neg.	2.1	6.4	5.6	1.2	3.4
	Total non-foodgrains	Area	0.4	1.2	5.0	3.7	1.2	2.2
	All crops	Area	-0.3	1.2	1.8	1.2	0.5	1.2

Crop		Item	1974/75 to 1983/84		1984/85 to 1995/96		1960/61 to 1995/96	
			ACGR (%)	ADT (%)	ACGR (%)	ADT (%)	ACGR (%)	ADT (%)
Non-food-grains	Groundnut	Area	0.4	5.1	2.1	4.0	0.7	4.0
		Yield	1.4	12.1	3.9	3.0	0.9	6.0
		Prod.	1.9	16.7	6.1	4.7	1.6	8.7
	Cotton	Area	-1.9	7.6	0.1	4.8	-1.3	4.8
		Yield	0.6	4.3	0.5	8.5	2.1	5.9
		Prod.	-1.5	11.3	0.5	10.4	0.7	9.0
	Sugarcane	Area	2.5	5.3	5.3	3.7	4.4	6.5
		Yield	-0.1	3.1	0.5	1.8	1.2	2.4
		Prod.	2.6	7.0	5.9	4.6	5.7	7.8
	Others	Area	-0.4	4.4	4.5*	9.2*	1.3*	5.1*
	Total non-foodgrains	Area	neg.	2.2	3.3*	3.6*	0.8*	2.5*
	All crops	Area	-0.8	5.1	neg*.	2.3*	-0.2*	2.7*

Note: 1. Due to non-availability of data, these values have been calculated with 1991-92 as the terminal year.
2. In calculating the annual compound growth rates (ACGR), the averages for the trienniums at the beginning and the end of each period are considered.
3. The annual average percentage deviation from the trend given by the three-year moving averages is used as a measure of fluctuation of the series (ADT).

Perhaps the most striking result to come out from the Table is the widely differing growth performance registered by different crops. Thus considering the period of nearly three and a half decades – from the early sixties to mid-nineties – as a whole, the foodgrain production has registered a very modest growth of just about 1.4 percent per annum; this growth rate, it may be noted, is in fact less than the growth rate of population in the state – which is of the order of 1.7 percent per annum between 1961 and 1991 – which would imply that per capita production of foodgrains in the state in fact has declined over this period. Movement of cropped area away from the foodgrains is a major factor underlying this poor performance in foodgrains production; the rather moderate growth in productivity – which grew at a rate of just about 2 percent per year – is also a contributory factor in this lacklustre performance.

Looking at the individual crops among the foodgrains, it is clear that the poor performance of the sector as a whole is very largely due to a very poor performance of the coarse cereals whose production in fact has registered a decline, at the rate of around 1.0 percent per year, over the period; and this decline in production is solely due to a reduction in the area under these coarse cereals. It may be noted that even with this decline – of the order of more than two percent per annum – these coarse cereals, viz., Cholam (Jowar), Cumbu (Bajra) and Ragi, still account for a significant proportion – nearly a sixth – of the gross cropped area in Tamil Nadu. The performance of the most important crop, viz., rice – which accounts for nearly a third of the gross cropped area in the state – has been relatively better: although this crop has also lost some area – albeit at a much lower rate (0.4 percent per year) compared to coarse cereals – its production has registered a modest gain – of the order of about 2 percent per annum – because of productivity increases. But it is the pulses – which account for nearly a tenth of the gross cropped area in the state – which have registered the best performance among food grains. Gains in area as well as productivity – modest though, in both – have resulted in a

reasonably high growth rate – of more than 3 percent per annum – in the production of pulses in the state over last three and a half decades upto the mid-nineties.

Coming to non-foodgrains, the most important among them, viz., groundnut – which accounts for nearly a sixth of the gross cropped area in the state – has registered sluggish, albeit positive, growth. Productivity gains in this important cash crop in the state have been very modest. Of the two minor cash crops in the state, viz., sugarcane and cotton – accounting for 3 to 4 percent each of the gross cropped area in the state – the former appears to have done very well: its production, over the three and a half decades has grown at a high rate of more than five percent per annum, and this growth is very largely due to a rapid growth in the area under this crop.

Cotton production on the other hand has virtually been stagnant over this period, and this is largely due to a decline in the area under the crop. As for the 'residue', viz., 'others', among the non-foodgrains – which consist mostly of high value cash crops like plantation crops, fruits and vegetables, condiments and spices etc – unfortunately we have not been able to obtain their production figures. But the area under these crops has registered a significant increase – of the order of 1.3 percent per year – over the period under consideration. Only sugarcane among cash crops and pulses among foodgrains have registered more rapid gains in area under them. As a consequence, these 'other' crops account for nearly a fifth of the gross cropped area in the state.

Patterns & Profiles of Growth:

It is also clear from the Table 5that the individual crops differ considerably in terms of their pattern or profile of growth across the three periods that we had demarcated within the last three and a half decades upto the mid-nineties. Thus, while the growth profile of the foodgrain sector as a whole broadly corresponds to the profiles sketched earlier, either for the primary sector income or for the agricultural sector as a whole, the individual crops within this sector have different profiles of growth. For the foodgrain sector as a whole, the first period, i.e., from 1960-61 to 1973-74, was a period of moderate growth with a moderate level of fluctuations; the second period, i.e., from 1974-75 to 1983-84, was a period of stagnation with high levels of instability; and the third period, i.e., from 1984-85 to 1995-96, was a period of recovery, with modest levels of growth and instability. Within the first period itself one could identify two sub-periods, as it were. In the first sub-period, i.e., from 1960-61 to 1968-69, there was in fact a decline in foodgrain production, due to a decline in both area and productivity; but this was followed by a short period, of just about four years from 1969-70 to 1973-74, of sharp recovery in foodgrain production, which was almost completely due to a sharp growth in yield. As is well known, this period happens to be the heyday of 'green revolution' in the country, as well as in Tamil Nadu. Thus, the overall growth profile for the foodgrain sector as a whole can be summarised as: stagnation or decline in the sixties; rapid recovery and growth for a short span of the period of 'green revolution'; stagnation with high levels of instability during a period of crisis (from 1974-75 to 1983-84); and a recovery in the last period (from 1984-85 to 1995-96).

The recovery phase from the mid-eighties to early or mid-nineties, seem to have lost its momentum and the sector has been suffering during the recent past with decline in area under important crops as well as decline in production. Area under food grains declined to 34.5 lakh hectares in 2001-02 from 36.33 lakh hectares in 1999-00. Production of food

grains fell to 76.8 lakh tonnes during 2001-02 from 88.42 lakh tonnes in 1999-00. Most of the important non-food crops have also experienced a decline during this period. However, the importance of non-food crops in the agricultural sector is growing over time. Ratio of area under food crops and non-food crops was 5:2 in 2000-01 as against 3:1 during 1980-81 (Table 5).

Table-6: Area, production and Yield of Foodgrains, Tamilnadu

Year	Area (lakh ha)	Production (lakh tones)	Yield (kgs/ha)
1999-2000	36.33	88.42	2434
2000-01	35.01	86.17	2461
2001-02	34.52	76.89	2228

Source: Directorate of Economics and Statistics

Now, the major foodcrop, viz., rice, follows more or less the same pattern as the foodgrain sector as a whole except that the growth rates in the two phases of recovery – in the green revolution period, and the period after the mid-eighties onwards – are higher in the case of rice compared to foodgrains as a whole. In sharp contrast, the coarse cereals have witnessed a consistent decline in their production all through the three-and-a-half-decade period from 1960-61 to 1995-96: In fact, the rate of decline in their production was the highest during the 'green revolution' period (of 1969-70 to 1973-74), and this was solely due to reduction in area under these crops during this period. The pulses, which have recorded the best growth performance among the foodgrains, have displayed an altogether different growth profiles. Their production grew at an extremely rapid rate – of the order of 20 percent per annum – during the short 'green revolution' period, with both area and productivity gains contributing to this performance, the former more than the latter. But this is a performance which obviously could not be sustained over a longer period, and the growth rate in the production of pulses has in fact witnessed a steady decline after this short period of very rapid growth. All the same, it is worth noting that in the period of crisis for the agricultural economy in the state – i.e., from 1974-75 to 1983-84 – the production of pulses in the state in fact kept growing at a high rate of around 6 percent per annum, albeit with high levels of fluctuation. In fact it is in the period from mid-eighties to mid-nineties – when recovery sets in the case of rice – that the growth rate of production for pulses declines sharply, to a level of just about 2 percent per annum, and instability also increases.

Coming to the non-foodgrains, the major cash crops in the state, viz., groundnut, had the same growth profile across the various periods and sub-periods, as the agricultural sector as a whole, or the foodgrain sector, except that the extent of instability in the case of groundnut appears to be higher compared to say, rice. The overall stagnation in groundnut production in the three and a half decades upto mid-nineties hides periods of stagnation (sixties), sharp recovery (green revolution period), stagnation with instability (1974-75 to 1983-84) and recovery (from the mid-eighties). In sharp contrast, the other stagnant cash crop, viz., cotton, has witnessed stagnation all through this period of three and a half decades. Sugarcane – the cash crop with a good overall growth performance – once again displays a different growth profile compared to the rest. A high growth period, albeit with high levels of instability, all through the sixties and early seventies, is followed by a relative stagnation in the seventies and early eighties, and a recovery thereafter upto the mid-nineties. Going by the performance of area under 'other' crops, they seem to follow the standard pattern for the agricultural sector as a whole, viz., stagnation in the sixties, rapid growth during the green revolution period, stagnation during the period of crisis and a recovery from around the mid-eighties uptil mid-nineties.

It should be obvious that the differing growth performances and profiles for different crops would lead to considerable changes over time within the agricultural sector in terms of its composition or cropping pattern. Before we come to a discussion on this issue, we would like to note a third important point from Table 5. Considering the period 1960-61 to 1995-96 as a whole, the extent of instability – as given by the average annual absolute percentage deviation from the trend (given by the three-year moving average series) – is significantly higher in the case of the production series, compared to either area or yield series; this seems to hold for all the major crops. This seems to indicate that, for the period as a whole, the area and yield instabilities have more often than not reinforced each other, or the area, yield and production have moved in unison, as it were, around the respective trends. But a closer look at the table shows that while this scenario is generally observed upto the mid-eighties, the picture is somewhat different thereafter. In the case of foodgrains – for rice in particular – the instability in production from around the mid-eighties onwards is roughly of the same order as for area and yield; and this appears to be true for the major cash crop in the state, viz., groundnut, and to a lesser extent for pulses also. This would perhaps imply that in this period of recovery – i.e., from the mid-eighties to mid-nineties – the area and yield fluctuations would have often been in opposite directions (with respect to the trend) and hence would have compensated one another, rather than reinforcing each other. This would have happened at least in the case of a few important crops like rice and groundnut [Table 7]. It is also noteworthy that it is in the period of crisis, viz., from 1974-75 to 1983-84 – when stagnation in production was coupled with a high degree instability – that area and yield fluctuations reinforce

Table-7: Number of Years when Area and Yield Reinforced or Compensated Each Other:

Crop	1960/61 to 73/74		1974/75 to 83/84	
	No of years when area and yield reinforce	No of years when area and yield compensate	No of years when area and yield reinforce	No of years when area and yield compensate
Rice	8 (61.5)	5 (38.5)	9 (90.0)	1 (10.0)
Coarse cereals	7 (53.8)	6 (46.2)	8 (80.0)	2 (20.0)
Pulses	7 (53.8)	6 (46.2)	8 (80.0)	2 (20.0)
All food grains	10 (76.9)	3 (23.1)	8 (80.0)	2 (20.0)
Groundnut	6 (46.2)	7 (53.8)	7 (70.0)	3 (30.0)
Cotton	10 (76.9)	3 (23.1)	8 (80.0)	2 (20.0)
Sugarcane	6 (46.2)	7 (53.8)	5 (50.0)	5 (50.0)

Crop	1984/85 to 95/96		1960/61 to 95/96	
	No of years when area and yield reinforce	No of years when area and yield compensate	No of years when area and yield reinforce	No of years when area and yield compensate
Rice	2 (18.2)	9 (81.8)	19 (55.9)	15 (44.1)
Coarse cereals	7 (63.6)	4 (36.4)	22 (64.7)	12 (35.3)
Pulses	7 (63.6)	4 (36.4)	22 (64.7)	12 (35.3)
All food grains	5 (45.5)	6 (54.5)	23 (67.6)	11 (32.4)
Groundnut	5 (45.5)	6 (54.5)	18 (52.9)	16 (47.1)
Cotton	4 (36.4)	7 (63.6)	22 (64.7)	12 (35.3)
Sugarcane	6 (54.5)	5 (45.5)	17 (50.0)	17 (50.0)

Note: Figures in brackets give percentages to total number of years in each period.

each other to generate wide fluctuations in production. The reversal of this trend in the following period – particularly in the case of rice – perhaps is a factor underlying the recovery witnessed by the agricultural sector in this period, and perhaps points to a significant extent of reorganisation within the sector. We shall return to this issue later in the report.

Changes in the Cropping Pattern

As pointed out earlier the differential rates and patterns of growth for different crops in the state would have meant considerable shifts in the cropping pattern over time. Table 8 below brings it out clearly.

Table 8: Shifts in Cropping Pattern in Tamil Nadu:

Type of land	Year	Percentage distribution of gross cropped area by crops			
		Food-grains			
		Rice	Coarse cereals	Pulses	Total
All land	Triennium ending 1962-63	35.3	29.0	5.7	70.0
	Triennium ending 1991-92	29.1	17.7	12.8	59.5
On irrigated land	Triennium ending 1962-63	72.9	12.0	0.3	85.2
	Triennium ending 1991-92	59.2	4.8	1.7	65.6
On unirrigated land	Triennium ending 1962-63	5.1	42.7	10.0	57.8
	Triennium ending 1991-92	4.4	28.3	21.8	54.5

Type of land	Year	Percentage distribution of gross cropped area by crops					
		Non-foodgrains					
		Groundnut	Cotton	Sugarcane	Others	Total	Index of crop diversification
All land	Triennium ending 1962-63	12.4	5.3	1.0	11.3	30.0	119.3
	Triennium ending 1991-92	15.4	3.8	3.4	17.9	40.5	173.4
On irrigated land	Triennium ending 1962-63	3.2	3.1	2.2	6.4	14.8	65.3
	Triennium ending 1991-92	9.6	3.0	7.5	14.2	34.4	84.2
On unirrigated land	Triennium ending 1962-63	19.7	7.1	Nil	15.3	42.1	131.7
	Triennium ending 1991-92	20.1	4.4	Neg.	20.9	45.5	183.8

Note: The index of crop diversification is defined as [1/SD] x 100, where SD is the standard deviation for the distribution of GCA across the major crop groups. In calculating the SD, the 7 major crops are considered for 'all land'; in the case of unirrigated land sugarcane is left out, and hence n=6, and 'pulses are left out in the case of irrigated land (n=6).

The shifts in the cropping pattern over the three decades from the early sixties to early nineties, appear to subsume two distinct processes. The first is a shift from foodgrains to non-foodgrains, which, for want of a better term, we call the process of

commercialisation. The other process, which we call the process of crop diversification[1], involves shifts in area across different crops or crop groups. Thus considering the foodgrain sector alone, it is clear that the importance within this sector of coarse grains has clearly declined over the period under consideration, while that of pulses has clearly increased. Similarly within the cash crop economy, the relative importance of sugarcane and 'other' crops have increased, while that of cotton has declined. It is clear from the table that a process of increasing diversification of the cropping pattern was under way in Tamil Nadu over the three decade period from the early sixties to early nineties.

An interesting point that comes out from the table is the striking difference between irrigated and unirrigated lands in terms of the relative importance of these two processes – of commercialisation and diversification – in each. In the early sixties, the irrigated economy was essentially a rice economy – accounting for nearly 70 percent of its gross cropped area – and hence, predominantly a foodgrain economy; the cash crops accounted for just about a sixth of its gross cropped area. But over the three decades from the early sixties to early nineties, the relative importance of cash crops within irrigated agriculture has increased considerably, from around one-sixth of the gross cropped area in the early sixties to about a third in the early nineties. The relative importance of all the major cash crops, except cotton, has increased over this period. The unirrigated economy in contrast was significantly more commercialised and diversified even by the beginning of the sixties, but over the next three decades the degree of commercialisation – percentage of area under non-foodgrains – did not increase by any significant amount; but the increase in the extent of crop diversification here was very striking, and was in fact higher than the corresponding increase (in diversification) on irrigated land. Considering just the unirigated sectors among the foodgrain pulses gained significantly, while coarse grains lost out; and within the cash crops 'other' crops gained and cotton lost out. In sum it appears that while increasing commercialisation – as we have defined it – was largely confined to the irrigated economy within the agricultural sector, there was a significant increase in crop diversification within the unirrigated economy.

We had noted earlier that not only the growth rates, but also the growth profiles across different periods, varied considerably across crops. This would imply that the rate at which these two processes of commercialisation and diversification proceeded would also vary across different periods. Table 9 gives the indices for these two processes for each year between 1960-61 and 1991-92 clearly bring this out.

The degree of commercialisation witnessed a steady, but a moderate, rate of increase on irrigated land upto the middle of seventies; thereafter, there appears to be an increase in this rate, particularly in the eighties. On the unirrigated land in sharp contrast, there has been no consistent increase in the degree of commercialisation over any of the stretches in the three decade span from the early sixties to early nineties, but the index seems to have witnessed a considerable degree of fluctuation around the stagnant trend. The

---

[1] We have used a very simple index to measure the extent of crop diversification: D= 1/SD x 100,where D is index of diversification, and SD is the standard deviation for the distribution of the GCA across the major crop group. In calculating this index, the seven crop groups – as given in table 43 – are considered for 'all land'; sugarcane is left out in the case of unirrigated land and 'pulses are not considered in calculating this index for irrigated land. We may just note here that the broad conclusions given in this section do not change, even if we include all the seven crop groups for both irrigated and unirrigated lands.

eighties, it appears, have witnessed some increase in this index (on unirrigated land), but it is difficult to say whether this trend will be maintained, or it is part of a cycle, to be followed by a downtrend, as the earlier behaviour of the index seem to suggest. Be that as it may, the overall result of these two trends – on irrigated and unirrigated area respectively – is that considering the agricultural sector as a whole, the degree of commercialisation increased only at a modest rate till about the early or mid-eighties, and this rate picked up considerably thereafter upto the early nineties. Thus between the trienniums ending 1962-63 and 1985-86, i.e., over a period of more than two decades, the degree of commercialisation increased from 30.0 percent to 33.0 percent; and between the trienniums ending 1985-86 and 1991-92, i.e., in less than a decade, the increase was from 33.0 percent to 40.5 percent.

Table-9: Indices for Degree of Commercialisation and Diversification of the Cropping Pattern in Tamil Nadu:

Year	All land		Irrigated land		Unirrigated land	
	C	D	C	D	C	D
1960-61	30.3	121.4	15.1	67.2	42.4	134.5
1961-62	29.9	119.8	15.0	65.2	41.6	123.6
1962-63	29.7	116.6	14.4	64.1	42.4	132.1
1963-64	30.1	118.9	16.1	65.3	41.8	135.1
1964-65	29.2	117.3	15.5	64.9	40.6	130.6
1965-66	31.1	121.2	15.6	66.3	43.9	136.5
1966-67	30.4	118.7	15.5	64.8	43.2	136.9
1967-68	31.5	121.4	17.7	67.8	44.0	139.5
1968-69	31.9	126.9	19.0	70.8	42.3	141.1
1969-70	30.0	120.1	17.1	68.0	40.8	127.6
1970-71	29.6	119.8	18.3	67.8	39.4	133.5
1971-72	32.4	126.8	19.7	68.7	43.4	141.5
1972-73	31.8	126.0	19.1	67.3	43.4	157.7
1973-74	33.8	134.6	23.1	72.5	43.7	165.9
1974-75	33.7	132.6	22.0	73.5	43.5	145.9
1975-76	30.0	120.1	18.5	68.6	40.0	126.0
1976-77	31.3	130.1	21.3	72.9	38.2	132.1
1977-78	31.7	127.5	21.6	70.3	41.0	141.1
1978-79	32.9	130.9	24.2	73.6	41.5	151.7
1979-80	33.2	123.2	23.7	71.9	43.3	145.3
1980-81	36.5	137.7	27.6	77.9	45.7	153.0
1981-82	33.0	132.2	25.2	72.9	40.7	143.0
1982-83	35.2	148.5	27.5	75.5	41.5	142.2
1983-84	32.1	135.5	25.3	72.3	38.0	138.6
1984-85	34.6	135.1	27.3	73.9	41.7	151.7
1985-86	32.3	145.8	29.6	77.1	34.8	145.5
1986-87	36.5	157.1	30.3	78.5	41.3	155.5
1987-88	37.9	157.9	33.7	83.4	41.2	160.1
1988-89	36.4	169.7	34.0	84.1	38.4	157.1
1989-90	37.7	175.8	33.8	84.8	40.9	169.0
1990-91	41.2	176.3	34.8	85.4	46.1	183.0
1991-92	42.6	163.9	34.5	82.4	49.6	186.0

Note: C is the index of degree of commercialisation, given by the percentage of gross cropped area under non-foodgrains; D is the index of crop divesification as defined in table 40 and footnote 1.

As for the increase in crop diversification, we had noted earlier that this phenomenon was particularly striking on unirrigated land. And even here, the increase was only modest – with considerable fluctuations around the trend – upto the early eighties; the diversification index increased at a higher rate, with much lower fluctuation, after that.

Irrigated land, where the index of diversification – and the increase in it – are lower compared to unirrigated land, nevertheless, follows a similar pattern, albeit with lower fluctuations. As a consequence the process of crop diversification follows a similar trend – a moderate rate of increase upto the early eighties, and an accelerated one thereafter – even for the agricultural sector as a whole.

In sum, two broad generalisations regarding shifts in the cropping pattern in the state seem possible. First, of the two forms that such shifts can take, the process of increasing commercialisation is largely prevalent in the irrigated sector; on the unirrigated sector these shifts have largely taken the form of crop diversification, with no consistent trend towards increasing commercialisation. The fact that the two indices display a higher level of fluctuation around the trend in the unirrigated sector also points to a higher degree of volatility of this sector. The second generalisation is that while both these processes have witnessed an increase over the period under consideration, the rates of increase was only moderate till about the early eighties; and these rates picked up thereafter.

These processes of commercialisation and diversification constitute just one facet of changes related to land use in the agricultural sector in Tamil Nadu. Shifts in land use across seasons – Kharif and Rabi – and changes in overall land use patterns are some of the other important changes observed in the agricultural sector. Let us look in to these issues in some detail.

Shifts across Crop Seasons

The data for distribution of gross cropped area across seasons are available only for foodgrains, and that too only for the period 1970-71 to 1995-96. Some important features of the Kharif and Rabi foodgrain economy in the state during this period are summarised in Table 10 below.

It appears that the Rabi season played only a minor role – accounting for just about 2 to 3 percent of the area and production – in the foodgrain economy of Tamil Nadu right upto the mid-eighties. During the period 1974-75 to 1983-84 – the period of stagnation and instability – the Rabi crop suffered more compared to the kharif crop. But in the period of recovery, i.e., in the period from 1984-85 onwards, the importance of the Rabi crop in the foodgrain sector seems have increased dramatically.

Table-10: Growth Performance of Foodgrains in Kharif and Rabi Seasons:

Season	Item	1974-75 to 1983-84		1984-85 to 1995-96	
		ACGR (%)	ADT (%)	ACGR (%)	ADT (%)
Kharif	Area	-1.0	7.2	-2.3	3.8
	Yield	1.3	8.1	4.6	2.4
	Production	0.3	14.3	2.2	5.3
Rabi	Area	-4.7	7.2	8.3	21.6
	Yield	-0.6	6.7	-3.2	9.6
	Production	-5.2	11.7	4.9	23.8

Note: 1. In calculating the annual compound growth rates (ACGR), the averages for the trienniums at the beginning and the end of each period are considered.

2. The annual average percentage deviation from the trend given by the three-year moving averages is used as a measure of the fluctuation of the series (ADT).

In the beginning of this period – in the year 1986-87 to be exact – there was a rapid shift in the area under the Rabi crop, from 167,000 hectares in 1985-86 to 739,000 hectares in 1986-87, while the area under kharif foodgrains declined from 4450,000 hectares in 1985-86 to 3394,000 hectares in 1986-87. All through the rest of this period Rabi had a significant presence in the foodgrain sector of Tamil Nadu, accounting for roughly a tenth of area and production.

But it is also clear from the table that this shift to the rabi crop was accompanied by a very high degree of instability. The indices for instability for the Rabi crop in this period (1984-85 to 1995-96) are very high; they are in fact much higher than in the previous period of general stagnation and instability in the agricultural sector (1974-75 to 1983-84), in contrast to the kharif crop where the period of recovery from the mid-eighties was also a period of higher stability. In fact one can identify three short, but distinct, phases within this period in terms of the shifts across kharif and rabi crops in the foodgrain sector. In 1986-87 there was a rapid shift of land of better quality – perhaps land with good irrigation – from kharif to rabi, leading to a sharp increase in yield in Rabi (from 1275 Kgs/ha in 1985-86 to 2494 Kgs/ha in 1986-87), and a decline in yield in Kharif (from 6961 Kgs/ha in 1985-86 to 5341 Kgs/ha in 1986-87); this situation continued in 1987-88 also. In the second phase, i.e., in 1988-89, some of this land was shifted back to kharif. The area under kharif increased from 3419,000 hectares in 1987-88 to 3774,000 hectares in 1988-89 and the area under Rabi declined from 761,000 hectares to 328,000 hectares. The shift led to a decline in yield on Rabi and an increase on kharif. This situation continued – with some fluctuations – till 1993-94, when a considerable shift of area occurs once again from kharif to Rabi but this time, the area shifted appears to be of poorer quality, thus resulting in a decline in yield on Rabi and an increase in kharif.

It is high time, we believe, that we register a strong caveat. These rapid shifts across crop seasons, as well as a number of other changes observed in the agricultural sector in Tamil Nadu in the period from around the mid-eightiesto mid-nineties, may have something to do with the quality of data. The abolition of the post of the traditional village karnam – who knew his village well –and the appointment of village administrative officers in his place in the early eighties, it is often claimed, introduced considerable amount of noise in agricultural data, in area statistics in particular. Now it is difficult to say that how of much of the trends, shifts and patterns that we have observed so far in the period from the mid-eighties onwards is attributable to real changes in the economy, and how much of it is due to the noise in the data. All the same, we would also claim that not all the patterns that we have observed so far can be attributed to the noise in the data alone. As for example, the shifts that we had observed earlier in the compensating or reinforcing movements of area and yield and the period of recovery (1984-85 to 1995-96) compared to the period of stagnation and instability (1974-75 to 1983-84). So, a proper attitude to many of the results we have presented so far would be that they should be read with a degree of skepticism, and be seen as broad, plausible hypotheses, and no more.

With this caveat in mind, the shifts across crop seasons that we had talked about earlier, may be viewed as one of the facets of a plausible scenario of reordering and reorganisation of the agricultural sector that is under way in the period of recovery – from around the mid-eighties to mid-nineties – in Tamil Nadu. We had noted some other facets of this scenario. The processes of diversification and commercialisation, the shifts observed in the compensating or reinforcing movements of area and yield etc. Let us now

turn to one other facet of it, and this relates to changes in overall land utilisation patterns in the state.

Changes in Land Utilisation Patterns:

Table 11 below gives data on land utilisation pattern in Tamil Nadu. The averages for the sixties, seventies and eighties, and for the period 1990-94 & for 1999-2002 are given in the table.

Table-11: Trend in Land Utilisation Pattern

(Annual average in ' 000 hectares)

Classification of area	1960-61 to 1969-70	1970-71 to 1979-80	1980-81 to 1989-90	1990-91 to 1993-94	1999-00 to 2001-02
1. Total geographical area	13013 (100.0)	13006 (100.0)	13006 (100.0)	13018 (100.0)	12991 (100 0
2. Land under forests	1906 (14.6)	2005 (15.4)	2076 (16.0)	2149 (16.5)	2134 (16.4)
3. Barren and uncultivable land	885 (6.8)	705 (5.4)	557 (4.3)	510 (3.9)	476 (3.7)
4. Culturable land	660 (5.1)	415 (3.2)	308 (2.4)	303 (2.3)	363 ( )
5. Permanent pastures and other grazing land	334 (2.6)	198 (1.5)	145 (1.1)	12.3 (0.9)	121 (0.9)
6. Land put to non-agricultural uses	1357 (10.4)	1600 (12.3)	1795 (13.8)	1857 (14.3)	1998 (15.4)
7. Follows Current follows	969 (7.4)	1202 (9.2)	1618 (12.4)	1055 (8.1)	1082 (8.2)
Other follows	612 (4.7)	531 (4.1)	703 (5.4)	1033 (7.9)	1259 (9.4)
Total follows	1581 (12.1)	1733 (13.3)	2321 (17.8)	2088 (16.0)	2341 (17.6)
8. Land under miscellaneous tree crops and groves not included in the net sown area	264 (2.0)	215 (1.7)	182 (1.4)	233 (1.8)	262 (2.1)
9. Net sown area	6026 (46.3)	6135 (47.2)	5622 (43.2)	5755 (44.2)	5313 (40.8)
10. Gross cropped area	7200	7456	6677	7094	6361
11. Cropping intensity (percent)	119.5	121.5	118.8	123.3	119.7

Note: Figures in brackets give percentages to total geographical area.

Source: 1. Upto 1989-90: Tamil Nadu – An Economic Appraisal, 1992-93; Government of Tamil Nadu.

2. For 1990-91 to 1993-94: Profiles of States, CMIE, March, 1997.

It is obvious that the pattern of land utilisation in the state has undergone considerable changes in the period from the early sixties to early part of the present , and three of these changes are worth mentioning. The first such striking change refers to a sharp decline in lands classified as 'permanent pastures and other grazing land', 'barren and uncultivable land' and 'cultivable waste'. The total area under these three categories has got halved, from 1879,000 hectares in the sixties to 936,000 hectares in the early nineties. While not all the areas under these categories can perhaps be classified as common property resources, the point noted above, we believe, does point to a sharp decline in the common property resources in the state. A study conducted in the early eighties in the dry regions of seven states – Tamil Nadu being one among them – very clearly brought out the sharp declines in the extent of CPRs in all these states between the early fifties and the early eighties [Jodha, 1990]. The decline in Tamil Nadu was one of the sharpest, next only to Rajasthan. The pressure on the CPRs – given by the number of persons per hectare of CPR area – was the highest in the state and had witnessed a very sharp increase, and the extent of dependence of the poor on the CPR in the state was one of the highest, again next only to Rajasthan [Table 12]. It is more than likely that this trend towards the decline in CPRs has continued in the state all through the eighties and after, with adverse

consequences for the poor whose dependence on these resources is of a much higher order compared to the rest.

Table-12 : Some Aspects of Common Property Resources in Dry Regions of India:

State	CPRs as a percent of total village area		Percentage decline in CPR area between 1950-52 and 1982-84	No of persons per 10 hectares of CPR area		CPR-income as a percent of income from all other sources in 1982-84	
	1950-52	1982-84		1951	1981	For the poor	For the rest
Andhra Pradesh	18	11	42	48	134	17	1
Gujarat	19	11	44	82	238	18	1
Karnataka	20	12	40	46	117	20	3
Madhya Pradesh	41	24	41	14	47	22	2
Maharastra	22	15	31	40	88	14	1
Rajasthan	36	16	55	13	50	23	2
Tamil Nadu	21	10	50	101	286	22	2

Source: Jodha [1990].

The second important change discernible in the pattern of land utilisation in the state is that the amount of land put to non-agricultural use has consistently increased over time, and in the early nineties roughly a seventh[2] of the states area was under non-agricultural use in contrast to just a tenth in the sixties. In fact in the early nineties the extent of non-agricultural use of land was one of the highest, among all the major states, in Tamil Nadu: only West Bengal had a higher percentage of its total area under non-agricultural use.

The third major change in the land utilisation pattern in the state refers to the magnitude and composition of cultivable land. If we define the potential cultivable land as the sum of net sown area; fallows, both current and long term; and culturable waste, this potential had remained more or less stable, at around 8200,000 hectares right upto the end of the eighties, registering a small decline in the early nineties. And a high and increasing proportion of this potential is brought under the plough. If we include net sown area and the fallows as area brought under cultivation in a broad sense, it represented close to 92 percent of the total cultivable potential in the sixties, and this proportion has increased to around 96 percent by the early nineties. But within the total area brought under cultivation (understood in the broad sense of inclusive of fallows), the area actually cultivated in any year – i.e., the net sown area – has in fact witnessed a decline in the eighties; on the other hand, the area under fallows has registered an increase over the years, and this is particularly true of the eighties; in the early nineties current fallows witnessed a decline while the long term fallows showed an increase. In fact by the early nineties, Tamil Nadu had one of the highest fallowing of land among the major states in the country. In 1993-94, close to a fourth (24.4 percent) of the total area brought under cultivation (i.e., net sown areas plus fallows) was left as fallows in Tamil Nadu; this proportion was higher only in two states, Andhra Pradesh (30.0 percent) and Bihar (29.7 percent).

---

[2] Of the total geographical area of the state, 4.7 percent was accounted for the urban areas in 1991. If we assume that all the land in urban areas is utilised for non-agricultural purposes, the percentage of rural land put to non-agricultural uses in the early nineties in Tamil Nadu is 10.1.

We may now briefly summarise our discussions so far on the agricultural sector. The major characteristics of this sector that we have noted so far are.

1) An increasing level of diversification of the cropping pattern over the years. This process, which is particularly discernible in the unirrigated sector, got accelerated from around the mid-eighties onwards.

2) An increasing degree of commercialisation of the agricultural sector over time. This process, which is confined mostly to the irrigated sector, appears to have got accelerated again, after the mid-eighties. Going by the indices that we have used for the degree of commercialisation – viz., the proportion of gross cropped area under non-foodgrains, and the geographical area earmarked for non-agricultural uses – rural Tamil Nadu is one of the most commercialised economie among the major states in the country today[3]

   We may just note here that the degree of commercialisation of the cropping pattern as measured by the proportion of non-foodgrains in the gross cropped area in fact understates the overall extent of commercialisation and market orientation of the agricultural sector. This is because foodgrains are also sold in the market, and perhaps increasingly so. While we do not have data to substantiate this hypothesis that the proportion of marketed surplus has increased over time in the case of foodgrains, there is reason to believe that the very process of crop diversification would have led to an increasing degree of market orientation of the foodgrain sector.

   This is because the proportion of output marketed in the case of coarse cereals – whose importance in foodgrain production has declined considerably over time – is of a lower order compared to rice, whose weight within the foodgrain sector has not decline by any significant extent. The data on marketed surplus for different crops for the year 1992-93 given in Table 13 below clearly brings it out.

   Thus increasing commercialisation, crop diversification and market orientation appear to go hand in hand in the agricultural sector in Tamil Nadu, and these processes, it appears, got accelerated from around the mid-eighties.

Table-13: Marketed Surplus for Foodgrains in Tamil Nadu, 1992-93

	Marketed surplus as a percent of production		
Crop	Kharif	Rabi	Total
Rice	49.5	46.1	48.1
Cholam	37.9	49.9	40.9
Cumbu	44.5	45.8	44.7
Ragi	26.8	33.8	29.3

Source: Quarterly Statistical Abstract of Tamil Nadu, Quarter ended March 1994; Department of Statistics, Government of Tamil Nadu.

---

[3] In the early nineties, i.e., for the period 1992-95, only Kerala and Gujarat had a substantially higher proportion of the gross cropped area under non-foodgrains compared to Tamil Nadu; in Andhra Pradesh this proportion was marginally higher, and in Karnataka just about the same [See Jodha (1997)].

3) These processes of increasing commercialisation, diversification and market orientation are accompanied by a process of considerable reordering and reorganisation of the agricultural sector, particularly in the period from the mid-eighties onwards. Some of the manifestations of this process of reorganisation are: (a) increasing resort to fallowing; (b) within the cultivated land shifts across seasons, in response perhaps to contingencies involving water availability and rainfall; and (c) the increasing tendency for area and yield to compensate, rather than reinforce, each other – for rice crop in particular.

4) We had also noted that there was considerable diversity, across crops, within the agricultural sector, in terms of growth performance and growth profiles across different periods identified. But in broad general terms one could identify five periods / sub-periods in terms of its growth performance; a period of stagnation till the late sixties; rapid growth for a short period, from the late sixties to early seventies; a period of stagnation and instability from the mid-seventies to early / mid-eighties; and a recovery thereafter upto early or mid-nineties, and a period of crisis thereafter.

Now, what could be the factors underlying this growth performance and profile? What we provide below as an answer to this question, we should emphasise, should be seen only as broad general hypotheses, and no more.

Level and Changes in Input Use

We had noted earlier that going by the extent of use of modern inputs like HYVs, fertilisers etc, the agricultural sector in Tamil Nadu is relatively more modernised compared to most of the states in the country. And going by the trends in the use of these inputs like the HYVs and fertilisers, this process of modernisation, which began with the onset of green revolution in the late sixties, has proceeded at a more or less steady pace after that. The level of fertiliser use has increased steadily over this period. As for the HYVs, in the case of rice, after a very rapid diffusion in the green revolution period – i.e., from around the late sixties to early seventies – the level of adoption has been maintained at a high level; and in the case of coarse cereals there is a steady increase in the level of adoption of improved varieties [Table14].

But it is also clear from the table that the level and change in the use of inputs explain the growth performance in the agricultural sector only to a limited extent, except perhaps in the period from 1969/70 to 1973/74 when rapid diffusion of HYVs – in the case of rice in particular – appears to be a factor underlying the rapid growth of agricultural production. In the period when the agricultural sector went through a crisis with next to no growth and with high instability – i.e., from 1974-75 to 1983-84 – HYV use in the case of rice was maintained at a high level, and HYV use in the case of coarse cereals and overall level of fertiliser use doubled. In the period of recovery from around the mid-eighties, early nineties the levels of input use – of HYVs, fertilisers, say – are significantly higher than in the earlier period, but the rate of increase in these levels are only modest – in fact these rates appear to be significantly lower compared to the previous period – and do not seem to explain fully the steady increase in productivity among the major crops in this period.

Table-14: Level of Input Use in Tamil Nadu Agriculture:

Input	1960-61 to 1973-74					
	1960/61 to 1968/69			1969/70 to 1973/74		
	Value of input			Value of input		
	At the beginning	At the end	ADT (%)	At the beginning	At the end	ADT (%)
Percent of GCA under HYV - Rice	NA	18.1	NA	65.5	79.7 (10.3)	4.2
Percent of GCA under HYV – Coarse cereals	NA	3.0**	NA	10.3	23.9 (52.3)	11.9
Gross Irrigation Ratio (Percent)	44.5	46.2 (0.6)	1.2	46.0	47.3 (1.4)	0.9
Fertiliser use – Kgs / ha of GCA	7	23 (21.9)	5.0	39	42 (3.8)	10.9

Input	1974-75 to 1983-84			1984-85 to 1991-92		
	Value of input			Value of input		
	At the beginning	At the end	ADT (%)	At the beginning	At the end	ADT (%)
Percent of GCA under HYV – Rice	85.5	83.6 (-0.3)	2.9	94.8	98.3 (0.7)	0.9
Percent of GCA under HYV – Coarse cereals	20.4	45.9 (12.3)	4.4	62.0	74.6 (3.8)	7.4
Gross Irrigation Ratio (Percent)	44.8	47.2 (0.7)	2.7	46.9	45.0 (-0.8)	1.8
Fertiliser use – Kgs / ha of GCA	39	78 (10.4)	3.7	100	120 (3.7)	2.8

Input	1960-61 TO 1991/92		
	Value of input		
	At the beginning	At the end	ADT (%)
Percent of GCA under HYV – Rice	18.1*	98.3 (7.6)	2.5
Percent of GCA under HYV – Coarse cereals	3.0**	74.6 (15.7)	7.0
Gross Irrigation Ratio (Percent)	44.5	45.0 (neg).	1.8
Fertiliser use – Kgs / ha of GCA	7	120 (10.3)	5.0

Note: 1. The values of input given are the averages for the trienniums at the beginning and the end of the periods. The annual compound growth rates, given in brackets are calculated using these values. ADT refers to annual (absolute) percentage deviation from the trend given by the three-year moving averages.

2. * refers to the triennium ending 1968-69; ** refers to the year 1968-69. The ACGR and ADT given for these inputs in the last two columns refers to the corresponding period in each case.

It is obvious that growth performance of agriculture is too complex a phenomenon to be explained solely in terms of gross levels of input use. The quality of inputs – as for example, the yield potential of different HYVs introduced at different times – the

combination in which the different inputs are used[4] etc, i.e., factors which have a crucial bearing on the efficacy of input use would play an important role as proximate factors underlying the growth performance in agriculture.

While we have very little to say directly on any of these issues in the context of Tamil Nadu, there is one important variable which would have a crucial bearing on all these factors, and about which we have some broad generalisations to offer – and this relates to irrigation.

Irrigation: Overall stagnation

One of the most striking aspects regarding irrigation in Tamil Nadu is the almost complete stagnation of the gross irrigation ratio – that is, gross irrigated area as a percent of gross cropped area – right from the early sixties, right through the period under consideration. In fact among the major states in the country only Kerala and Himachal Pradesh[5] appear to have witnessed a similar phenomenon. And in states where substantial agricultural modernisation and growth have occurred over this period, extension of irrigation appears to be a very major contributing factor. Thus in Punjab the gross irrigated ratio increased from 58.4 percent for the triennium 1962-65 to 94.6 percent in 1992-95; in Haryana this ratio had more than doubled over the same period, from 33.1 percent to 77.1 percent; Uttar Pradesh also witnessed a similar increase (from 27.0 percent to 62.3 percent); and so did West Bengal (from 22.6 percent to 54.3 percent). Tamil Nadu thus appears to be the only state with a relatively more modernised agricultural sector, where the overall irrigation level has remained virtually stagnant.

An important implication of this is that, since irrigation plays a central role in agricultural growth and modernisation, it is not extension of irrigation but changes within the irrigated sector that would have provided the basis for growth and modernisation of agriculture in Tamil Nadu. We shall return to this issue shortly.

Duality between Irrigated and Unirrigated Sectors

There is another important – albeit obvious – implication of this phenomenon to be noted. If irrigated area has remained stagnant at around half of the gross cropped area over the last four decades or so, the sharp dichotomy within the agricultural sector, between the irrigated sector on the one hand and the unirrigated on the other, is also likely to have persisted all through this period – unlike say in Punjab or Haryana where extension of irrigation would have modulated the overall importance of such a dichotomy or duality within the agricultural sector. In fact, one can go a step further and state that such a duality has got strengthened over this period, because modernisation and growth have

---

[4] The combination in which the different nutrients – i.e., N, P and K – are used is obviously an important consideration here. The average of the absolute percentage deviations of utilisation of these nutrients from the requirement would provide a rough index of deviation of fertiliser use from the required combination. This index was 43.1 for the triennium ending 1976-77, declined to 12.7 for the triennium ending 1983-84, and increased to 20.6 for the triennium ending 1991-92. Thus the period of crisis witnessed a decline in the deviation from the 'efficient' combination, and the period of recovery a reversal in it!

[5] In Himachal Pradesh the irrigation ratio for the triennium 1962-65 was 17.1 percent, and for 1992-95 it was 17.84 percent; in Kerala the ratio had in fact declined over this period from 19.7 percent to 12.3 percent [See Bhalla and Singh, 1997].

largely been confined to the irrigated sector in the state. The data we have on the area, yield and production on irrigated and unirrigated lands from 1970-71to late eighties – summarised in Table 15 clearly brings this out.

Over the seventies and the eighties while the gross cropped area under both irrigated and unirrigated sectors has declined – in fact, more so in the former than the latter – there has been a substantial increase in the yield levels in the irrigated sector, but a sharp decrease in it in the unirrigated sector. The net result of this has been an increase in production – a rather modest one, of 0.8 percent per annum – in the irrigated sector, and a sharp decline in it – of more than 2 percent per annum – in the unirrigated sector. Thus, whatever growth or modernisation has occurred in the agricultural sector in Tamil Nadu, it has been confined solely to the irrigated sector and hence the duality between the irrigated and the unirrigated sector, if anything, has got sharpened over time.

Table-15: Area, Yield and Production, Irrigated and Unirrigated Land

Year	Gross cropped area ('000 hectares)		Yield (in Rs per GCA in 1986-87 prices		Value of production (in Rs crores in 1986-87 prices	
	Irrigated land	Unirrigated land	Irrigated land	Unirrigated land	Irrigated land	Unirrigated land
1970-71	3410	3974	5022	2455	1713	976
1971-72	3530	4111	6100	2726	2153	1121
1972-73	3673	4026	6422	2535	2359	1021
1973-74	3674	3976	7802	2970	2866	1181
1974-75	3033	3607	6731	1976	2042	713
1975-76	3376	3859	6924	2638	2338	1018
1976-77	3001	4146	6868	2471	2061	1024
1977-78	3723	4045	7707	2934	2869	1187
1978-79	3818	3866	7477	3000	2855	1160
1979-80	3983	3734	7203	2501	2869	934
1980-81	3294	3176	6960	1851	2293	588
1981-82	3427	3482	7549	2721	2587	947
1982-83	2732	3324	5377	2172	1469	722
1983-84	3249	3696	6354	2378	2064	879
1984-85	3506	3582	6826	1586	2393	568
1985-86	3240	3579	7654	2126	2480	775
1986-87	2844	3664	11781	2341	3351	858
1987-88	2945	3783	7218	1687	2126	638
1988-89	2873	3578	8185	1769	2352	633
1989-90	3044	3778	8664	2106	2637	796
ACGR (%)	-1.1	-0.5	1.9	-1.9	0.8	-2.4
ADT (%)	5.5	2.8	8.0	12.0	11.6	13.7

Note: 1.The averages for the triennium at the beginning and the end of the period are considered for calculating the annual compound growth rate (ACGR).
2.The annual average deviation from the trend (ADT) is the absolute percentage deviation from the trend given by the three-year moving averages.

A closer look at the table also reveals that this duality between the irrigated and the unirrigated sectors got strengthened particularly from around the mid-eighties. The ratio

of gross yield (i.e., yield per gross cropped area) on irrigated land to gross yield on the unirrigated land showed only a mildly increasing trend, with substantial fluctuations, till about the early or mid-eight; but it witnessed a very rapid increase thereafter. And this was largely because while the unirrigated yield declined steadily all through the period – although the decline after the early / mid-eighties appears to be of a slightly higher order – the irrigated yield which remained more or less constant with wide fluctuations, till about the early eighties, increased steadily thereafter.

Now, what are the factors underlying this sharp increase in the irrigated yields from around the mid-eighties onwards? How does one explain the differential performance of these yields from around the mid-eighties compared to the earlier period? As we had pointed out earlier the level and change of modern inputs like fertilisers, HYVs etc can provide only a partial explanation, if at all, for this phenomenon. We had also noted earlier that this is the period beset with problems of quality of data; given this, what we offer below as explanation for the phenomenon should be seen as only preliminary hypotheses and conjectures.

When we look into the ratio of gross yield (i.e., yield per gross cropped area) to net yield (i.e., yield per net sown area) for both irrigated and unirrigated sectors we find that while the gross yield is less than the net yield, for both irrigated and unirrigated lands, all through this period, the gap between the two appears to have narrowed in the case of irrigated land from around the early or mid-eighties, while in the case of unirrigated land this gap, if anything, seems to have widened in this period. And the narrowing of the gap in the case of irrigated areas occurred because while both gross yield and the net yield increased, the rate of increase was higher in the former. This phenomenon is related – at least in part – to shifts in area and production of foodgrains across crop seasons from around the mid-eighties onwards noted earlier. From around the middle of eighties till the late eighties better quality land had been shifted from Kharif to Rabi, thus leading to a sharp increase in Rabi productivity and production. The declining yield gap on irrigated land from the mid to late eighties noted above is commensurate with this phenomenon. It may be noted that there was a sharp fall in the yield levels in Rabi in the nineties, probably because poorer quality land was shifted to this season. Unfortunately we do not have yield rates on irrigated (or unirrigated) lands for this period, and hence cannot say whether there was any corresponding increase in the gap between net and gross yields on the irrigated land in this period. Be that as it may, the point made above perhaps illustrates a more general phenomenon. The period from mid-eighties onwards appears to have witnessed a considerable degree of re-ordering and restructuring in the agricultural sector – like shifts across seasons, fallowing etc – which probably are a factor underlying the increase in irrigated yield and production, and hence of an agricultural recovery in this period. One other manifestation of this process of reorganisation of agriculture from the mid-eighties onwards, we had noted earlier, was the increasing tendency for area and yield to compensate, rather than reinforce, each other. This is particularly true for paddy. And since paddy – as we shall see shortly – is almost completely irrigated, it is likely that this phenomenon is more prominent in the irrigated sector compared to the unirrigated sector. The limited data we have on area, yield and production on irrigated and unirrigated land from 1970-71 to 1989-90 do lend some support to this proposition. In the period 1970-71 to 1983-84, area and yield reinforced each other in 10 out of 13 years – and compensated each other in only 3 years – on irrigated lands; in the period from 1984-85 to 1989-90, in sharp contrast, area and yield compensated each other in all the five years in

this sector. In the unirrigated sector area and yield compensated each other 3 out of 13 years in the first period, and 3 out of 5 years in the second period.

Now, if these reorderings in the agricultural sector – which are perhaps more prominent in its irrigated sector – are a factor underlying the recovery of the agricultural sector from around the mid-eighties, the question still remains as to the basis, if any, for these reorderings as such. Could these be reflections of – or responses to – some more basic transformations within the irrigation regime itself? Let us turn to a brief discussion of these issues now.

Irrigation Levels for Different Crops

While the irrigation regime in an overall sense – in terms of gross irrigation ratio – has witnessed a high degree of stagnation in Tamil Nadu, there have been important structural changes within the irrigation regime itself. One such important change relates to shifts in irrigated area across different crops. We had discussed earlier these cropping pattern shifts on irrigated – and unirrigated – lands, and the processes of commercialisation and diversification associated with these shifts. These shifts have also resulted in important changes over time in the irrigation ratios – i.e., gross irrigated area as a percent of gross cropped area – for different crops which in turn have influenced the yield levels and growth performances of different crops. The data on these irrigation ratios are given in Table16.

A couple of points made earlier get reinforced by the table. The process of commercialisation of the cropping pattern – which as we noted earlier, was largely confined to the irrigated sector – also gets reflected in the increasing irrigation ratios for cash crops like groundnut, cotton and 'other' crops. It is also clear that the irrigation ratio had also influenced the growth performance in a broad general sense: crops which have performed better are either those with a high level of irrigation all through, or those with an increasing irrigation ratio thus reinforcing the point we had made earlier that growth was largely confined to the irrigated sector.

Table-16: Irrigation Ratios for Different Crops

Crops		1960-61 to 1973-74					
		1960/61 to 1968/69		ADT (%)	1969/70 to 1973/74		ADT (%)
		Value of GIR			Value of GIR		
		At the beginning	At the end		At the beginning	At the end	
Food grains	Rice	91.9	91.8 (neg)	0.6	91.6	92.1 (0.3)	0.8
	Coarse cereals	18.3	19.3 (0.9)	3.7	17.7	18.3 (1.7)	1.5
	Pulses	2.1	1.5 (-5.5)	19.7	2.2	2.3 (2.2)	16.7
	Total	54.1	55.5 (0.4)	1.2	54.2	55.8 (1.5)	0.9
Non-food-grains	Groundnut	11.4	14.9 (4.6)	6.2	17.2	19.8 (7.3)	10.9
	Cotton	25.6	27.5 (1.2)	4.4	31.2	37.0 (8.9)	7.2
	'Others'	25.2	26.8 (1.0)	4.8	28.3	28.3 (0.0)	7.8
	Total	22.0	25.6 (2.6)	2.8	27.5	29.8 (4.1)	4.0
All crops		44.5	46.2 (0.6)	1.2	46.0	47.3 (1.4)	0.9

Crops		1974-75 to 1983-84		ADT (%)	1984-85 to 1991-92		ADT (%)
		Value of GIR			Value of GIR		
		At the beginning	At the end		At the beginning	At the end	
Food grains	Rice	90.6	93.8 (0.5)	1.2	92.1	91.6 (-0.1)	0.9
	Coarse cereals	17.5	13.7 (-3.4)	3.9	11.9	12.0 (0.2)	2.7
	Pulses	1.9	2.2 (2.1)	12.9	3.6	6.4 (12.2)	16.5
	Total	51.9	52.5 (0.2)	3.0	50.8	49.6 (-0.5)	1.9
Non-food-grains	Groundnut	17.0	22.7 (4.2)	7.1	28.1	28.2 (0.1)	5.0
	Cotton	37.3	42.0 (1.7)	5.0	44.2	35.8 (-4.1)	9.9
	'Others'	28.4	38.3 (4.4)	5.1	38.2	36.3 (-1.0)	11.0
	Total	29.3	36.7 (3.3)	2.0	39.6	38.2 (-0.7)	4.1
All crops		44.8	47.2 (0.7)	2.7	46.9	45.0 (-0.8)	1.8

Crops		1960-61 to 1991-92		ADT (%)
		Value of GIR		
		At the beginning	At the end	
Food grains	Rice	91.9	91.6 (neg)	0.9
	Coarse cereals	18.3	12.0 (-1.4)	3.2
	Pulses	2.1	6.4 (3.9)	16.2
	Total	54.1	49.6 (-0.3)	1.9
Non-food grains	Groundnut	11.4	28.2 (3.2)	7.0
	Cotton	25.6	35.8 (1.2)	6.4
	'Others'	25.2	36.3 (1.3)	6.9
	Total	22.0	38.2 (1.9)	3.0
All crops		44.5	45.0 (neg)	1.8

Note: 1. Sugarcane, which is completely irrigated, has been left out.
2. The value of gross irrigation ratio (GIR) given are averages for the trienniums at the beginning and the end of the periods. The annual compound growth rates, given in brackets, are calculated using these values. ADT refers to annual (absolute) percentage deviation from the trend given by the three-year moving averages.

Paddy among foodgrains and sugarcane among non-foodgrains – crops with a very high level of irrigation ratios – have a good growth record; coarse cereals with a low and declining level of irrigation have a very poor growth record; pulses, which are essentially unirrigated crops, but have witnessed some increase in the irrigation ratio, have also witnessed good growth. Among the cash crops increase in irrigation ratio has gone along with an increase in yield in cotton, and a moderate growth in output in the case of groundnut. But apart from this broad, general relationship between irrigation and growth, the level and change in the irrigation ratio in any of the periods identified does not appear to have any clear relationship with growth in any of the crops. Neither do instability indices for irrigation ratios for different crops correspond to instabilities in their production. Thus the relationship between irrigation and growth performance – even at the level of individual crops – can only be at a broad, general level. The phenomenon of agricultural growth or performance at a more disaggregrated level appears to be far too complex to be understood in terms of the behaviour any one input variable, including an important one like irrigation. Among the other dimensions that one has to consider in order to understand growth and transformation in agriculture is the important one of quality of irrigation. That the quality of irrigation is an important factor is clear from the fact that the degree of instability – in area, yield or production – is quite substantial even in the case of irrigated agriculture [Table 15]. The fact that different crops have displayed different degrees of instability in their irrigation ratios [Table 16] perhaps also indicates

that the quality of irrigation varies across crops. It appears that better quality irrigation is earmarked for better irrigated crops like rice and sugarcane, and poorly irrigated crops – like coarse cereals and pulses – as also cash crops like cotton and groundnut have to make do with irrigation of poorer quality also.

An important determinant of the quality of irrigation is the source of irrigation. The structural changes within the irrigation regime in Tamil Nadu in terms of the sources, would thus have an important bearing, on its growth performance. Let us turn to this important issue now.

Sources of Irrigation

The irrigation regime in Tamil Nadu has undergone important changes in terms of its sources [Table17]. The most striking change to be noted is the steady gains made by the wells – both in terms of net irrigated area (NIA) as well as the percentage of total net irrigated area contributed by the source – and a corresponding decline in the importance of tanks.

Considering the period as a whole, the net area irrigated by wells, as well as the contribution of wells to total net irrigated area increased by more than 2 percent per annum; and both these variables for tanks witnessed a decline of the order of close to two percent in the same period. Since the net irrigated area – as well as gross irrigated area – had remained more or less stable over the period, and since the net irrigated area under the third major source, viz., canals had also remained largely unaltered, this would mean that wells had largely gained at the expense of tanks. The net outcome of it all was that by around the middle of the seventies, the irrigation regime in Tamil Nadu had undergone a complete transformation in terms of its internal structure. Tanks, which were the most important source to begin with, had, by then become the least important; wells, which were the least important, next to tanks and canals to begin with, had become the most important source of irrigation by the middle of seventies; and canals – whose importance did witness some decline over time – managed to hold the middle ground accounting for about a third of the net area irrigated all through.

While this transformation within the irrigation regime has gone on all through the period under consideration, it appears that its pace was particularly rapid during the two phases of rapid agricultural growth identified by us earlier, viz., the first phase of green revolution (1969-70 to 1973-74) and the period of recovery in the agricultural sector (1984-85 to 1991-92). In the first of these two periods, area under well irrigation increased very rapidly; while the wells continued to gain even in the next period (1974-75 to 1983-84), the rate of increase had seen a sharp decline in this period; but this rate appears to have picked up once again in the period of recovery, i.e., from the mid-eighties, although it still was much lower than the rate of increase attained in the first phase of green revolution. But there seems to be an important difference between these two periods: The first period, viz., 1969-70 to 1973-74, saw an all round extension of irrigation, under all the major sources, and by the end of this period the three sources were more or less evenly matched, each accounting for nearly a third of the net irrigated area. The period of recovery from around the mid-eighties, in sharp contrast, is one where only the wells gained area, mostly at the expense of tanks: by the end of this period wells had established a clear dominance over the other two, as a source of irrigation.

Table-17: Irrigation by Different Sources

Source	Item	1960-61 to 1973-74					
		1960/61 to 1968/69			1969/70 to 1973/74		
		Value		ADT (%)	Value		ADT (%)
		At the beginning	At the end		At the beginning	At the end	
Canals	NIA	903	882 (-0.4)	2.2	907	933 (1.4)	1.4
	Percent of total NIA	36.3	35.0 (-0.6)	2.4	34.9	33.6 (-1.9)	1.8
Wells	NIA	602	691 (2.3)	2.5	762	880 (7.5)	2.2
	Percent of total NIA	24.2	27.5 (2.2)	3.6	29.3	31.6 (3.9)	2.6
Tank	NIA	941	902 (-0.7)	3.7	900	934 (1.9)	3.8
	Percent of total NIA	37.8	35.8 (-0.9)	2.5	34.6	33.6 (-1.5)	2.7

Source	Item	1974-75 to 1983-84					
		Value			Value		
		At the beginning	At the end	ADT (%)	At the beginning	At the end	ADT (%)
Canals	NIA	825	844 (0.3)	6.5	830	801 (-0.7)	5.1
	Percent of total NIA	33.7	33.4 (-0.1)	3.9	33.2	32.2 (-0.6)	5.9
Wells	NIA	873	977 (1.6)	2.4	1016	1132 (2.2)	3.7
	Percent of total NIA	35.7	38.8 (1.2)	5.7	40.7	45.4 (2.2)	1.2
Tank	NIA	715	687 (-0.6)	14.0	632	544 (-3.0)	7.6
	Percent of total NIA	31.9	27.0 (-2.4)	10.1	25.2	21.8 (-2.9)	6.8

Source	Item	1960-61 to 1991-92		
		Value		ADT (%)
		At the beginning	At the end	
Canals	NIA	903	801 (-0.4)	4.2
	Percent of total NIA	36.3	32.2 (-0.4)	3.6
Wells	NIA	602	1132 (2.2)	2.7
	Percent of total NIA	24.2	45.4 (2.2)	3.6
Tank	NIA	941	544 (-1.9)	8.1
	Percent of total NIA	37.8	21.8 (-1.9)	6.0

Note: 1. 'Other' sources which account for less than 2 percent of the net irrigated area (NIA) have been left out.

2. The values given are averages for the trienniums at the beginning and the end of each period. The annual compound growth rates, given in brackets, are calculated using these values. ADT refers to annual (absolute) percentage deviation from the trend given by the three-year moving averages.

3. The values of net irrigated area (NIA) are in 'thousand hectares'.

There is another important point to be noted from the table. The extent of instability within the irrigation regime is the highest for the tanks, and the least for wells. This would perhaps imply that in terms of quality of irrigation – viz., in terms of assurance and controllability of supply – well irrigation appears to be the best of the three major sources, followed by canals, and then, tanks. It is also noteworthy that the degree of instability which remained at a low level in the first period (1960-61 to 1973-74) increased, rather sharply, in the next period, viz., 1984-85 onwards. The degree of instability declined sharply in the case of tanks, but the picture was somewhat mixed in the case of the other

two sources: in the case of canals instability declined if one considered the net irrigated area but it had shown an increase if one considered the percentage contribution of the source to the total net irrigated area; and it was the other way round in the case of wells. Anyway, the behaviour of some of the overall indices for the irrigation regime – like the gross irrigated area, the gross irrigation ratio, the net irrigated area, irrigation intensity etc – would indicate that the period 1974-75 to 1983-84 was the period of high instability even in this regime [Table 18].

The factors underlying the instability in the irrigation regime are perhaps too complex for us to deal with them in any detail here; but there is one rather obvious candidate viz., the pattern of rainfall, whose influence on the irrigation regime, and hence on agricultural production, is worth looking into in some detail.

Table-18: Index of Instability for the Irrigation Regime

Indices in the irrigation regime	Index of instability (ADT, Percent)				
	1960/61 to 1973/74		1974/75 to 1983/84	1984/85 to 1991-92	1960/61 to 1991/92
	1960/61 to 1968/69	1969/70 to 1973/74			
Net irrigated area (NIA)	1.6	1.3	6.4	2.6	3.4
Gross irrigated area (GIA)	2.2	1.7	7.5	3.7	4.2
Gross irrigation ratio	1.2	0.9	2.7	1.8	1.8
Irrigation intensity	0.9	0.6	1.3	1.2	1.1

Note: 1. Irrigation intensity = GIA / NIA; gross irrigation ratio = GIA / GCA
2. Index of instability, ADT, refers to annual (absolute) percentage deviation from the trend given by the three-year moving averages.

Rainfall and Irrigation

That variability in rainfall does have an important bearing on variability in gross irrigated area. One can identify three distinct phases – more or less corresponding with the three periods of growth performance identified earlier – in the relationship between these two variables. Till about the mid-seventies the variability in gross irrigated area was of a relatively low order, and did not show a high degree of synchronicity with rainfall; the period of mid-seventies to mid-eighties – the period of stagnation and instability in the agricultural sector – was a period of high variability in the gross irrigated area, and there was a high degree of responsiveness and synchronicity between rainfall and gross irrigated area; in the period from the mid-eighties to early nineties – the period of agricultural recovery – synchronous movement between rainfall and gross irrigated area persisted, but the degree of variability in the latter declined, partly perhaps in response to a decline in the variability in rainfall itself in this period.

Now, it is obvious that the behaviour of the gross irrigated area – and its responsiveness to rainfall – would depend on the way the area irrigated by each of the three major sources of irrigation would have behaved, and their responsiveness to rainfall. And each of the three major sources displayed a different pattern in this. As one would expect, dependence on

rainfall was the highest for tank irrigation. The movement of area irrigated by tanks was almost completely synchronous with the movement of rainfall all through the period under consideration. And in sharp contrast, well irrigation, which has the lowest degree of instability of the three sources of irrigation, also displayed the lowest degree of synchronicity or responsiveness to rainfall. But it is canal irrigation which displays the most interesting – and somewhat intriguing – pattern. In the period upto the early or mid-seventies the extent of instability in canal irrigation remained low, and so also its responsiveness to rainfall. From around the mid-seventies to mid-eighties – the period of stagnation and instability in Tamil Nadu agriculture – the extent of instability in canal irrigation was high, and it displayed a high degree of responsiveness to rainfall. In the period after the mid-eighties while instability persisted – albeit at a lower level – it is the relationship between this instability and the pattern of rainfall that is somewhat intriguing. It appears that in this period, rainfall and area irrigated by canals, rather than moving synchronously, mostly move in opposite directions.

The onset of this instability in canal irrigation in the state in the early seventies is perhaps related to the inter-state dispute – as yet unresolved – between the state and its neighbour, Karnataka, on sharing the waters of river Cavery. This dispute began in the early seventies. Because of significant growth in utilisation of Cauvery waters in Karnataka – the upper riparian state – since the 1970s, the quantum of availability – as well as its reliability – of these waters for Tamil Nadu witnessed a significant decline from the early 1970s onwards[6]. And since Cauvery is the major canal irrigation system in Tamil Nadu, this has been a factor responsible for the poor performance of the canal irrigation system as a whole in Tamil Nadu in this period. A very poor record of rainfall[7], coupled with the poor performance of the canal system would have also affected the performance of the other surface irrigation system, viz., tanks, which, as we noted earlier, recorded the highest degree of instability in this period.

Now, how does one explain the rather intriguing phenomenon of area irrigated by canals and rainfall moving in opposite directions – rather than synchronously – in the period from around the mid-eighties to the beginning of the nineties? Is this phenomenon part of a process of reordering within the agricultural sector – within the irrigated sector in particular – that we had talked above earlier? We may note here that the Cauvery dispute is still unresolved, and hence the uncertainties associated with the quantum and timing of water release in this system continue to persist, and on an average the quantum of water received by cultivators in the Cauvery delta in Thanjavur after the early seventies has been of a significantly lower order compared to what they were used to earlier. By around the mid-eighties cultivators, as well as the state government, appear to have realised that these problems are likely to persist at least in the foreseeable future, and considerable reordering and restructuring within the agricultural sector were set in motion to counter these problems. In a year with poor monsoon, when these problems are likely to be exacerbated, and normal agricultural operations – particularly in paddy cultivation – are likely to be disrupted, cultivators adopted a number of strategies like: (a) shift from paddy

---

[6] For a detailed account of the history of this dispute, and a framework for its solution, see Guhan [1993].

[7] The average rainfall for the first period (1960-61 to 1973-74) was 926mm, and the coefficient of variation 11.2 percent; the corresponding figures for the second period (1974-75 to 1983-84) were 912mm and 21.1 percent; and for the period 1984-85 to 1991-92, 833 mm and 13.2 percent. It may be noted that the record of rainfall improved considerably in the nineties.

to pulses, groundnut etc – i.e., crop diversification and commercialisation which we had talked about earlier; (b) shift from kharif (kurvai) to Rabi (samba), which, as we had noted earlier, set in around the mid-eighties; (c) shift to HYVs which are more suitable to samba – more blast tolerant varieties of ponni, ADT36 – rather than the usual ones like IR 50 and TKM9 etc; (d) cultivate paddy with broad casting technique replacing transplantation etc. All these strategies are likely to lead to a lowering of the average yield – and would the extension of gross irrigated area during a year of bad monsoon be a compensatory move on the part of cultivators to counter this likely decline in yield? We may recall here that from around the mid-eighties area and yield movements tended to compensate one another, unlike in the previous period when they reinforced each other, and that this phenomenon was particularly noticeable on irrigated land.

We may briefly summarise our discussions so far on the major structural changes that have taken place within the irrigation regime, and their implications for the growth process in agriculture in Tamil Nadu over the last three decades or so. The first, and rather short, episode of rapid agricultural growth in the period 1969-70 to 1973-74, represents the initial phase of green revolution in the state, with a rapid diffusion of modern inputs – particularly, the HYV for rice – and of irrigation, well irrigation in particular. This period of rapid growth was followed by a period of stagnation and instability in the agricultural sector from around the mid-seventies to mid-eighties. While the diffusion of modern inputs – like fertilisers, HYVs (particularly for coarse cereals) – as well as changes within the irrigation regime – replacement of tanks by wells – continued apace in this period, these factors were overshadowed, as it were, by the crisis in irrigation, partly due to intensification of river water dispute – on Cauvery – with Karnataka, and partly due to a poor record of rainfall. Agricultural recovery from around the mid-eighties in the state is somewhat difficult to explain. If this recovery is real – and not just an illusion created by problems with the data base – two broad sets of factors seem to underlie it: The first is the rapid replacement of tank irrigation – the least reliable of the three major sources of irrigation – by well irrigation. While this process had gone on all through the period from around the sixties, the pace of this replacement was particularly sharp in the period from the mid-eighties, and by the end of the eighties. Well irrigation had gained an unquestioned predominance within the irrigation regime, with tank irrigation reaching an all time low. This would provide a higher degree of controllability – for the farmers who own the wells – on irrigation water compared to the earlier periods. Well irrigation is also more intensively used compared to canals or tanks: the average irrigation intensities (the ratio of gross irrigated area to net irrigated area) for the period 1987-88 to 1991-92 were 118.4 percent for canals, 116.2 percent for tanks and 127.9 percent for wells. We may also note here that extension of well irrigation from the mid-eighties has come about very largely through energisation of existing/dug wells, or an increase in the number of tubewells [Table 19]. Faced with a depleting and receding ground water level, this could be the response of farmers – the richer among them in particular – aided by state policies like free electricity supply for agricultural use – to maintain high level, intensity and reliability of ground water use.

Table-19: Dugwells, Tubewells, Energised Wells in Tamil Nadu:

	Tube wells			Dug wells			
Year	Electric	Diesel	Total	Electric	Diesel	Others	Total
1981-82	62715	10955	73670	666935	143109	788671	1598715
1985-86	54335	8567	62902	796933	181117	684636	1662686
	(-3.5)	(-6.0)	(-3.9)	(4.6)	(6.1)	(-3.5)	(1.0)
1992-93	81713	20359	102072	947111	289283	442536	1678930
	6.0)	(13.2)	(7.2)	(2.5)	(6.9)	(-6.0)	(0.1)

Year	All wells		
	Electric	Diesel	Others
1981-82	729650	154064	788671
1985-86	851268 (3.9)	189684 (5.3)	684636 (-3.5)
1992-93	1028824 (2.7)	309642 (7.3)	442536 (-6.0)

Note: Figures in brackets give annual compound growth rates with respect to the previous row.
Source: Season and Crop Reports, Government of Tamil Nadu.

The second set of factors underlying agricultural recovery from around the mid-eighties seem to be operating very largely on canal irrigated lands. They essentially relate to what we have termed the 'reorderings' within the agricultural sector – like shifts in cultivation across crops and seasons; fallowing; experimentations with inputs like HYVs, and with different agricultural techniques etc. These 'reorderings' it appears, are a response to problems relating to uncertainties in quantum and timing of water availability on canal irrigated lands – problems, which have their genesis in the still unresolved inter-state river water dispute.

The net result of the above was that agricultural production, which in the period from mid-seventies to mid-eighties displayed a high degree of instability – very largely in response to vagaries of the monsoon – was put on a much more even keel from around the mid-eighties, and its instability, and responsiveness to fluctuations in monsoon, got considerably modulated.

A couple of implications of our discussions above on the changes in the irrigation system and their implication for agricultural production may be noted. First of all the processes noted above, viz., growth of well irrigation and various processes of reordering, seem to be confined solely or largely to the irrigated sector within agriculture, and hence, so would be the process of recovery from around the mid-eighties onwards. This would sharpen the duality between the irrigated and unirrigated sectors within agriculture – a point which we had noted earlier.

But the irrigated sector itself appears to harbour a duality within it, viz., one between wells – essentially private sources of irrigation, with intensive, controlled use of irrigation water – at one extreme, and the tanks – essentially public sources with a high degree of volatility – at the other extreme; canal irrigation – a public source with significant instability, but one where a considerable degree of reordering in response to volatility appears to have taken place – perhaps falls between the two extremes.

Now, how do these 'dualities' relate to the structure of landholding pattern in the state? Do they tend to reinforce the inequalities engendered by a skewed landholding pattern – which, as we shall see shortly, is as much a phenomenon in Tamil Nadu as elsewhere in the country? Is there evidence to believe that the better off sections among the cultivators have more access to irrigation – to better quality irrigation in particular? Some data pertaining to these issues from the agricultural census of 1990-91 are summarised in Table 20 below.

As regards overall access to irrigation, the picture is somewhat mixed. If one looks at percentage of holdings with access to irrigation, the larger farmers[8] appear to do distinctly better than the smaller ones; but if the gross irrigation ratio (i.e., gross irrigated area as a percent of gross cropped area) is considered, the equation gets reversed in that the smaller size-classes have a higher value of this ratio compared to the larger ones. This would imply that while a smaller proportion among the poorer farmers have access to irrigation, for those among them who have such access, irrigation is carried out more extensively covering a larger proportion of their holdings; and among the larger farmers with access to irrigation a smaller part of the holding is covered by it.

Table-20: Some Indices on Irrigation across Different Size-classes of Landholdings in Tamil Nadu, 1990-91

Size-class of holdings	Access to irrigation		
	Percent of holdings with irrigation	Gross irrigation ratio	Wholly irrigated holdings as a percent of irrigated holdings
Marginal	43.9	51.7	87.6
Small	49.2	45.3	63.6
Semi-medium	54.3	43.1	50.0
Medium	60.4	42.6	39.4
Large	62.7	36.7	32.2
All size-classes	46.1	45.6	78.0

Size-class of holdings	Access to different sources of irrigation							
	Distribution of irrigated holding by source (%)				Distribution of irrigated area by source (%)			
	Canals	Tanks	Wells	Tube wells	Canals	Tanks	Wells	Tube wells
Marginal	28.7	37.9	26.1	5.6	31.3	35.2	25.8	5.8
Small	23.3	24.9	43.6	6.7	31.2	24.8	36.2	6.4
Semi-medium	21.1	21.4	49.3	6.8	31.6	21.4	38.7	7.1
Medium	19.4	18.9	52.7	7.4	31.9	18.9	39.5	8.4
Large	18.4	18.9	51.3	9.7	33.6	19.3	35.5	10.5
All size-classes	26.7	33.3	32.4	6.0	31.6	26.4	33.7	6.9

Size-class of holdings	Characteristics of wells			Percent of wells not in use
	Percent of wells (in use) which are energised			
	Electricity	Diesel	Total	
Marginal	60.8	20.7	81.5	5.8
Small	69.0	18.6	87.6	3.7
Semi-medium	73.0	17.2	90.2	3.4
Medium	78.6	13.6	92.2	3.2
Large	80.4	12.0	92.4	3.5
All size-classes	67.7	18.5	86.2	4.5

Note: 1. Holdings less than a hectare are marginal; 1-2 hectares are small; 2-4 semi-medium; 4-10 medium and above10, large.
2. 'Other sources' (accounting for less than 2 percent of irrigated area) are left out.
Source: Agricultural Census, 1990-91.

The inverse relationship between percentage of wholly irrigated holdings among the irrigated ones on the one hand, and size-class of holdings on the other, testifies to this.

---

[8] The agricultural census data – from which the table is prepared – gives data by size-class of holding, and not by size-class of farmers. This, if anything, is likely to understate the extent of concentration in landholding, and the inequalities in access to irrigation.

Coming to the quality of irrigation, there appears to be a clear, unambiguous relationship between the size of holding and this aspect. The quality improves as we move to higher size-classes. For example, wells as a whole (i.e., wells plus tube wells) account for only a third of the holdings irrigated among marginal farmers; the corresponding proportion for the medium and large farmer is nearly 60 percent. And a higher proportion of the wells are energised in the case of larger farmers; and this differential is particularly sharp if we consider only wells energised by electricity. The larger farmers also have a slightly smaller percentage of wells not in use. If we look at the irrigation source of a poorer quality – viz., tanks – there appears to be a clear inverse relationship between the size-class and access to this source. This source accounts for close to 40 percent of the irrigated holdings in the case of marginal farmers, while for the medium and large farmers the corresponding proportion is less than a fifth.

In sum, a significant proportion of poorer farmers do not have any access to irrigation; and of those who have such access, a significant proportion depend on extensive irrigation from a poorer quality source. In contrast a high proportion of richer farmers have access to irrigation – mostly to intensive, private sources with a high degree of controllability over water use.

While the dualities in the irrigation regime and the inequalities in landholding pattern appear, thus, to reinforce each other, there is another important dimension regarding the spread of irrigation across different size-classes in Tamil Nadu which should not be lost sight of; and this refers to the rather amazing spread and diffusion of well irrigation even among the poorer strata of peasantry in Tamil Nadu. It is clear from table 36 that even for the small farmers – those with 1-2 hectares of holding – wells constitute a most important source of irrigation: wells as a whole (i.e., wells plus tube wells) account for close to a half of their irrigated holdings, with canals and tanks accounting for a fourth each. And it is only for the poorest of the farmers – i.e., the marginal farmers – that tanks constitute the most important source; and even in their case wells as a whole are equally important – if not, slightly more – as canals. And this has an important implication regarding the very nature of the process of agricultural transformation in Tamil Nadu.

We had noted earlier that agricultural growth, recovery and modernisation in Tamil Nadu is based on significant changes in the composition within the irrigation system – rather than any extention of irrigation. The rapid extension of well irrigation – at the expense of tank irrigation – seems to have played a major role in this process. Or in other words, agricultural transformation in the state was largely based on what is termed the 'pumpset revolution'; and this is much more so compared to modernisation of the agricultural sector in states like Punjab and Haryana [Table21].

Table-21: Number of Pumpsets Per Thousand Hectares of Gross Cropped Area

State	1962-65	1980-83	1987
Tamil Nadu	31.94	218.82	194.07
Punjab	8.20	157.69	160.09
Haryana	2.32	71.50	120.47
All-India	4.58	49.16	64.94

Source: Bhalla and Singh [1977: A-8].

And this would have important implications for the spread and reach of agricultural modernisation in Tamil Nadu. Fist of all, well irrigation is likely to have a much wider spatial reach, compared to say canal irrigation. And hence the gains from an agricultural transformation (based on well irrigation) are likely to be distributed much more evenly across space compared to say, a transformation based on large surface irrigation systems, whose benefits tend to get concentrated in certain pockets. We had also noted above that there is a significant degree of diffusion of well irrigation even among the middle and small farmer sections in Tamil Nadu. Thus the spread and reach of modernisation of agriculture in Tamil Nadu – in spatial, and perhaps also in social terms – are of a higher order compared to most other states.

We should hasten to add that what we have said above should be viewed purely as a relative statement; and we do not say that gains from agricultural growth in Tamil Nadu are more or less equally distributed. As pointed out earlier, these gains have more or less completely bypassed the unirrigated sector, and this sector would have larger concentration of small and marginal farmers compared to the irrigated sector. And even within the irrigated sector gains accruing to those with poorer access to productive assets and modern inputs – to well irrigation in particular – would be of a lower order compared to those who do have such access. And the former group of farmers is likely to have significantly larger concentration of small and marginal farmers compared to the latter. The point we are making is simply this. While certain basic dualities, differentiations and inequalities – particularly in terms of access to productive assets like land and irrigation – continue to be central to the agrarian situation in Tamil Nadu, one can also see certain tendencies towards broad basing and diversification within the rural sector. Increasing crop diversification, commercialisation and market orientation; increasing role of non-agricultural employment within the rural sector; significant spatial and social reach of agricultural modernisation are some of the manifestations of this process of diversification and broad basing.

This coexistence of inequalities, dualities and diversifications on the one hand, and a significant degree of diversification and broad basing on the other, which happens to be an important characteristic of Tamil Nadu agriculture, appears to be a reflection of a similar phenomenon with respect to the asset holding patterns – land holding patterns in particular – in the rural areas. Let us now turn to a brief discussion on this.

Aspects of Landholding

A number of village studies conducted in different parts of Tamil Nadu have brought out the changing caste-landownership nexus in the state. The general trend of these changes has been a reduction in the extent and proportion of land held by the upper castes – the Brahmins in particular – and the transfer of land to one or more middle or lower caste communities in each locality or region. Thus in Appadurai, a village in Tiruchirapalli district, there was a 'reduction in the amount of land owned by outsiders, especially Brahmans', and a considerable increase in the landownership by the Muthuraja community, a community registered as one of the backward castes, between the early fifties and early eighties [Yanagisawa, 1996]. The studies on Slater villages – five villages

which were first studied by Prof. Gilbert Slater and his students around 1916, and resurveyed a number of times by different researchers later – have also documented similar tendencies. In Gangaikondan village in Tirunelveli district the shift was from Brahmins and Pillais to Maravars [Athreya, 1985]; in Dusi in northern Tamil Nadu it was from Brahmins to Vanniars [Guhan and Bharathan, 1984] etc.

The socio-economic and political factors underlying these changes in the caste-landownership nexus are far too complex to be dealt with here in any detail. The differential impact of, and response to, the Great Depression by different dominant landholding castes; professionalisation, urban-ward migration and the consequent loosening of the hold on village by upper castes, particularly the Brahmins; the role of the Dravidian movement in providing socio-economic and political space to the middle and lower castes – they have all had a role to play in this change. While not dealing with these issues in any detail, let us just note an important implication of these changes in the caste-landownership nexus in the state. The fact that land transfer have generally been from the upper castes – from Brahmins in particular – to one or more lower or middle castes in different regions or localities has meant that Tamil Nadu – unlike many other states in the country – does not have one or two dominant castes with state-wide presence. This would also mean that the gains from agricultural modernisation would be distributed more evenly across different caste compared to many other states. Agricultural growth in Tamil Nadu would have a wider reach not only in spatial terms, but also in social terms or caste terms.

Lest we give the impression that we are overstating the process of broad basing of the caste-landownership nexus, we would hasten to add that there are clear limits to this process; and it coexists with high levels of inequality in landownership and with processes of agrarian differentiation. Thus, while there has been a substantial transfer of landownership from the upper castes to middle and lower castes, access to land remains very low for the scheduled castes [Table 22]. This is particularly true for landholdings in higher size-classes, and for holdings with better quality irrigation like well irrigation.[9]

---

[9] A similar phenomenon is observable in the case of caste-occupation nexus in the state. The caste-occupation nexus has got considerably loosened, and hence there is considerable broad basing of occupational structure. But, while caste, thus, is no longer a determining factor it still remains a limiting factor in occupational choice. For example in silk-weaving - which has grown considerably over the last two decades – there is a large scale influx of non-weaving castes, but hardly any by the scheduled castes since skill acquisition through long-years apprenticeship becomes difficult because of continuation of untouchability.

Table-22: Access to Landholding by Scheduled Castes:

Item		Access Index		
		For SCs	For others	Ratio of access indices
Landholding by Size-class	Marginal	49.6	114.8	2.3
	Small	34.6	118.7	3.4
	Semi-medium	22.3	122.4	5.5
	Medium	12.3	125.8	10.2
	Large	5.3	128.8	24.2
Landholding by source of irrigation	Canals	33.9	120.7	3.6
	Tanks	41.6	118.3	2.8
	Wells	25.7	122.4	4.8
	Tube wells	30.3	121.7	4.0
	Other sources	31.9	115.6	3.6
	Gross Irrigated Area	32.5	120.6	3.7
All land holdings		29.9	120.4	4.0

Note: 1. The access index for a group (SCs or Others) for any category of land is defined as:

$$A = \frac{\text{(Percentage of land in the category owned by the group)}}{\text{(Percentage of total families in the group)}} \times 100.$$

If the access index is less than 100, the access is poor.

2. 'Others' refers to non-SCs / STs. Since STs account for a very small proportion of the population in Tamil Nadu, they have been left out.

Moreover, it is not as if gains through land transfer were uniformly distributed across all the households in the middle or lower castes to whom such transfers took place. It appears that a section of the erstwhile tenants belonging to these castes gained land, while another section lost the land they were cultivating because of evictions; and the transfers very rarely touched the landless agricultural labourers who more often than not belonged to the Scheduled Castes. In fact there is considerable evidence, from village studies, that there is a process of differentiation at work within these middle and lower castes. While some among them have gained land – and other productive assets – and moved up the peasant hierarchy, some have lost land,– either through eviction, sale, mortgage or subdivision over time and joined the ranks of agricultural labourers.

Underlying all these processes of differentiation and dualities in rural Tamil Nadu is the highly skewed distribution of productive assets. Access to land – which has not just economic, but social as well as political significance in rural India – continues to be very highly restricted and unequal in Tamil Nadu [Table23]. There are two important characteristics of the structure of landholding in Tamil Nadu which may be noted from the table. The first one may be called the process of 'marginalisation' of the structure of landholding, which in itself has two dimensions, a high and increasing proportion of landholdings in the marginal category, and a low and declining average size of holding in this category. Over the two decades, from 1970-71 to 1990-91, the number of marginal holdings increased by 87 percent in the state; while they accounted for nearly 60 percent of the total holdings in 1970-71, this proportion had increased to close to 3/4th by 1990-91. In 1990-91 this proportion in the state – at three-fourths – was significantly higher than the corresponding figure – of around 60 percent – for the country as a whole. In fact, of the major states in the country, only Kerala had a significantly higher proportion - 92.6 percent – of its holdings in the marginal category, and three other states at just about the same level – Bihar (76.6 percent), Uttar Pradesh and West Bengal (73.8 percent each).

Table-23: Distribution of Operational Holdings across Size-classes:

Size-class	1970-71		1979-80	
	Tamil Nadu		Tamil Nadu	
	No of holdings ('000)	Area ('000 ha)	No of holdings ('000)	Area ('000 ha)
Marginal	3125 (58.8)	1322 (17.1)	5015 (69.7)	1907 (24.7)
Small	1109 (20.9)	1578 (20.5)	1209 (16.8)	1710 (22.2)
Semi-medium	696 (13.1)	1914 (24.8)	658 (9.2)	1822 (23.6)
Medium	325 (6.1)	1893 (24.6)	269 (3.7)	1555 (20.2)
Large	59 (1.1)	1003 (13.0)	40 (0.6)	714 (9.3)
All-size classes	5314 (100.0)	7710 (100.0)	7191 (100.0)	7708 (100.0)

Size-class	1990-91			
	Tamil Nadu		All-India	
	No of holdings ('000)	Area ('000 ha)	No of holdings ('000)	Area ('000 ha)
Marginal	5848 (73.1)	2118 (28.3)	62106 (59.0)	24615 (14.9)
Small	1275 (15.9)	1794 (24.0)	19971 (19.0)	28707 (17.3)
Semi-medium	617 (7.7)	1687 (22.6)	13913 (13.2)	38348 (23.2)
Medium	228 (2.9)	1301 (17.4)	7630 (7.2)	45049 (27.2)
Large	31 (0.4)	574 (7.7)	1667 (1.6)	28885 (17.4)
All-size classes	7999 (100.0)	7474 (100.0)	105286 (100.0)	165603 (100.0)

Size-class	Average size of holdings (ha)			
	1970-71	1979-80	1990-91	
	Tamil Nadu	Tamil Nadu	Tamil Nadu	All-India
Marginal	0.42	0.38	0.36	0.40
Small	1.42	1.41	1.41	1.44
Semi-medium	2.75	2.77	2.74	2.76
Medium	5.82	5.78	5.71	5.90
Large	17.00	17.97	18.52	17.33
All-size classes	1.45	1.07	0.93	1.57

Note: Less than 1 ha is marginal; 1-2 ha small; 2-4 semi-medium; 4-10 medium; 10 and above large.
Source: Different Agricultural Census.

As for the other dimension of this process of marginalisation, viz., the low and declining size of marginal holdings, this average size in 1990-91, at 0.36 hectares, was one of the least in the country, with only Kerala having a lower figure (0.18 hectare). The net upshot of these two processes – a high and increasing proportion of marginal holding, and a low and declining average size of marginal holdings – is the high and increasing fragmentation of the overall landholding structure in the state. The total number of holdings in the state increased by about 50 percent between 1970-71 and 1990-91, almost the whole of this increase being accounted for by the increase in the number of marginal holdings. The overall average size of the holding also declined by about a third over this period, again, it appears, largely because of the decline in the average size of marginal holdings. In fact in 1990-91, the overall average size of holding in Tamil Nadu – at 0.93 hectare – was considerably lower than the corresponding all-India figure of 1.57 hectares, and was one of the lowest in the country again, with only Kerala having a considerably lower average (0.33 ha), and Uttar Pradesh and West Bengal having slightly lower averages (at 0.90 hectares in both). It may be worth noting that the two northern states with a high level of agricultural modernisation – viz., Punjab and Haryana – have a much lower level of marginalisation and fragmentation of the landholding structure. In 1990-91, the marginal

holdings accounted for only 26.5 percent and 40.7 percent of total holding in Punjab and Haryana respectively; the average size of marginal holding was 0.56 hectare and 0.47 hectare respectively; and the average size of all holdings was 3.61 hectares and 2.43 hectares respectively. Thus it appears that Tamil Nadu is a state – perhaps the only state – where relatively high levels of agricultural modernisation – as well as broadbasing and diversification – coexist with high levels of marginalisation and fragmentation of the landholding structure.

The second important characteristic of the landholding structure in Tamil Nadu is that concentration of landholding continues to be high. Even though the extent of concentration has declined over the seventies and eighties, in 1990-91, the top 3.3 percent of the holdings – those belonging to the medium and large size-class, i.e., operating 4 or more hectares of land – account for a fourth of the operated area; and the top tenth household – those with holding sizes of semi-medium (2-4 hectares) and above – account for nearly half the operated area. In fact, according to the Agricultural Census of 1990-91, the Gini coefficient for the distribution of land in Tamil Nadu was 0.761 – and it was the highest among the major states in the country.[10] We may note that even this figure is likely to understate the extent of concentration of productive assets, partly because, the Agricultural Census, which gives data holding-wise and not household-wise, is likely to understate land concentration, and partly also due to the fact that the extent of concentration of productive assets other than land is likely to be higher[11]

Marginalisation of holdings has continued even during the first half of the 1990s as well. Available Agricultural Census data (1995-96) indicates that the overall average size of the holding has fallen further to 0.91 hectares. Number of marginal holdings has increased from 73 to 74 per cent of the total holdings in the state. Concentration of land holding has also increased during this period. Without any reduction in their area, the top few holders in the state have reduced in numbers.

In sum, it appears that while some correlates of rural power structure – like the caste landownership nexus – have got modified, and perhaps become weaker and less rigid over time, the persistence of high levels of concentration in landownership – and in the ownership of productive assets – would also imply that there has hardly been any basic, fundamental change in the power structure in rural Tamil Nadu.

---

[10] The data on Gini coefficients is taken from Hirway and Mahadevia [1996], table 7; P WS-93.

[11] Ramachandran's detailed village study, of Gokilapuram – a village in Kumbum Valley, a vanguard agricultural area in the state – done in the late seventies very clearly demonstrates this: Major and medium landlords in the village – viz., those who own and control the largest landholdings in the village and do not participate in the major manual operations on the land – accounting for about 3 percent of the households in the village owned 33 percent of the total extent of crop land and cultivated 35 percent but owned 67 percent of surface-irrigated land and operated 58 percent of it; owned 50 percent – and operated 36 percent – of ground-water – irrigated land, and owned and operated 23 percent of unirrigated land; these household accounted for 79 percent of the 'other agricultural assets' in the village. [Ramachandran, 1990:74].

Table-24: Number and Extent of Holdings by Size Class, Tamil Nadu, 1995-96

S.No	Size Class	Number of holdings	Extent of Holdings	Average Size
1	Marginal	5951104	2210343	0.37
2	Small	1233836	1721288	1.39
3	Semi-medium	600833	1622810	2.7
4	Medium	199791	1134853	5.68
5	Large	26268	613910	23.37
6	Total	8011832	7303206	0.91

Concluding Observations

The agricultural sector in Tamil Nadu is relatively more modernised, commercialised, diversified and broadbased compared to many other states, and has witnessed a moderate rate of growth. And these changes, and the growth, seem to have come about in a context where the expansion of basic productive forces has been only at a moderate level. Thus, in the case of an all important productive force – viz., irrigation capacity as a whole – there has hardly been any expansion, in that gross irrigated area has virtually remained stagnant over the last three decades or so. Even in the case of overall capital formation in agriculture Tamil Nadu's record does not appear to be good. The data from the 1981 AIDIS summarised in Table 25 below – clearly bring this out. In a context like this, it is basically through internal structural changes – as in the irrigation regime – or through processes of 'reorderings', diversification etc within it that the agricultural sector in the state has got modernised, and has registered a moderate growth over the last three decades or so upto the early nineties. Thus, the agricultural sector in the state appears to be an 'efficient' one in so far as utilisation of existing productive forces and capacities is concerned; but it appears to have done poorly in terms of accumulation of productive forces.

Table-25: Private Fixed Capital Formation in Agriculture, 1981-82

Item		Tamil Nadu	India	States which are ahead of Tamil Nadu
1. Total capital expenditure per cultivator (Rs)		732 (12)	823	Punjab (2336), Haryana (1772), Kerala (1671), J and K (1357), Karnataka (1261), Rajasthan (985), Maharastra (975), UP (865), HP (829), AP (841), Gujarat (732).
2. Fixed capital formation in agriculture per cultivator (Rs)		164 (9)	176	Punjab (915), Haryana (652), Gujarat (322), AP (187), UP (178), Maharastra (304), Karnataka (253), Rajasthan (234).
Components of fixed capital formation – Rs per cultivator	3. Irrigation	64 (7)	46	Haryana (156), Maharastra (139), Gujarat (108), Punjab (94), Rajasthan (90), AP (68).
	4. Land improvements	29 (7)	26	Karnataka (88), Punjab (76), Maharastra (63), Kerala (33), Gujarat (32), Haryana (32).
	5. Agricultural improvements	57 (10)	82	Punjab (631), Haryana (439), Gujarat (175), UP (122), Rajasthan (99), Karnataka (83), Maharastra (81), AP (78), MP (72).
	6. Farm buildings	5 (13)	12	Only Bihar (3), Gujarat (3) and MP (4) have lower values; Orissa has the same value (5); Punjab has the highest value (83).

Note: Figures in brackets for Tamil Nadu give the rank of the state among 17 major states; and for other states the actual value of the item concerned.

Source: All-India Debt and Investment Survey 1981-82.

In sum, it appears that while some correlates of rural power structure – like the caste landownership nexus – have got modified, and perhaps become weaker and less rigid over

time, the persistence of high levels of concentration in landownership – and in the ownership of productive assets – would also imply that there has hardly been any basic, fundamental change in the power structure in rural Tamil Nadu.

State policies – either through direct investment or heavy subsidisation of inputs, including free electricity for agricultural use would have played a central role in this process of agricultural modernization. And hence, the first is the issue of sustainability of the process of modernisation and growth in the agricultural sector in Tamil Nadu, sustainability of the recovery that set in around the mid-eighties in particular is crucially dependent on such state support. How far can this growth or recovery can be sustained purely on the basic of 'reorderings' within the agricultural sector, in the absence of significant additions to productive forces is debatable. It is particularly so in the case of the irrigated sector, where the limits to internal, structure changes within the sector that have been at work, it appears, have been reached in terms of over-mining on groundwater; and the drying up of the major surface irrigation source, viz., tanks, in the state. Extension and efficient use of productive resources would necessitate appropriate policies like appropriate institutional mechanisms for restoration, repair, maintenance and efficient distribution irrigation water from surface sources, from tanks in particular, and for a planned and controlled use of groundwater. Withdrawal of the state – as it happened during the reform process – would hardly be a solution, but a recipe for crisis, as it happened during the later part of nineties.

These policies, noted above, would also have important implications for the second major issue to be dealt with, viz., the distribution of the gains from agricultural growth. Even though the process of diversification and growth in Tamil Nadu appears to be relatively more broad based compared to many other states, the fact that deep-seated, basic dualities and differentiations do persist would imply that these gains would be very unevenly distributed.[12] And in the absence of a major change in the pattern of distribution of productive assets – of land in particular – there is unlikely to be a major dent on the massive problem of rural poverty in the state.

---

[12] For a detailed account of these issues for Tamil Nadu agriculture till the middle of seventies see Kurien [1981]. Madras Institute of Development Studies [1988] extends some of the analysis done by Kurien uptill about the mid-eighties.

Appendix

Performance of the Agricultural Sector in Tamil Nadu, 1993-94 to 2002-03

Sl. No.	Variable	Value (3 year average for the triennium ending)		Annual Compound Growth Rate (%)
		1995-96	2002-03	
1	NSDP originating from `Agriculture & allied Activities' - in constant 1993-94 prices (Rs.in lakhs)	1294225	1304956	0.12
2	Production of food grains (total) – (in '000 tonnes)	7914	6922	-1.9
3	Production of rice (in '000 tonnes)	6533	5842	-1.8
4	Production of coarse cereals (in '000 tonnes)	1098	818	-4.1
5	Production of pulses (in '000 tonnes)	283	262	-1.1
6	Production of sugarcane (in terms of cane) – (in '000 tonnes)	31742	33902	+0.94
7	Production of groundnut (nuts-in-shells) (in '000 tonnes)	1716	1109	-6.0
8	Production of cotton (in '000 bales of 170 Kgs. lint each	402	210	-8.9
9	Net area irrigated (`000 ha)	2776	2666	-0.6
10	Gross area irrigated (`000 ha)	3438	3175	-1.1
11	Gross area irrigated by tanks (`000 ha)	711	574	-3.0
12	Gross area irrigated by wells (`000 ha)	1706	1685	-0.2
13	Gross area irrigated by canals (`000 ha)	1003	900	-1.5
14	Per hectare fertilizer consumption (Kgs.)	118	151	+3.6

Performance of the Agricultural Sector in Tamil Nadu, 1993-94 to 2002-03

Sl. No.	Variable	Value (3 year average for the triennium ending)		Annual Compound Growth Rate (%)
		1996-97 (Base TE 93-94 ≡ 100	2002-03 (Base TE 93-94 ≡ 100	
1	Index Number – Area under food crops	74.51	92.94	+3.8
2	Index Number – Production of food crops	113.00	112.46	-0.1
3	Index Number – Yield of food crops	140.87	101.99	-5.2
4	Index Number – Area under non-food crops	131.30	74.09	-9.1
5	Index Number – Production of non-food crops	163.80	91.73	-9.2
6	Index Number – Area under all crops	92.20	87.36	-0.9
7	Index Number – production of all crops	138.79	108.00	-4.1
8	Index Number – Yield of all crops	112.75	100.83	-1.8

AGRICULTURAL CRISIS IN ANDHRA PRADESH : CAUSES AND REMEDIES

By

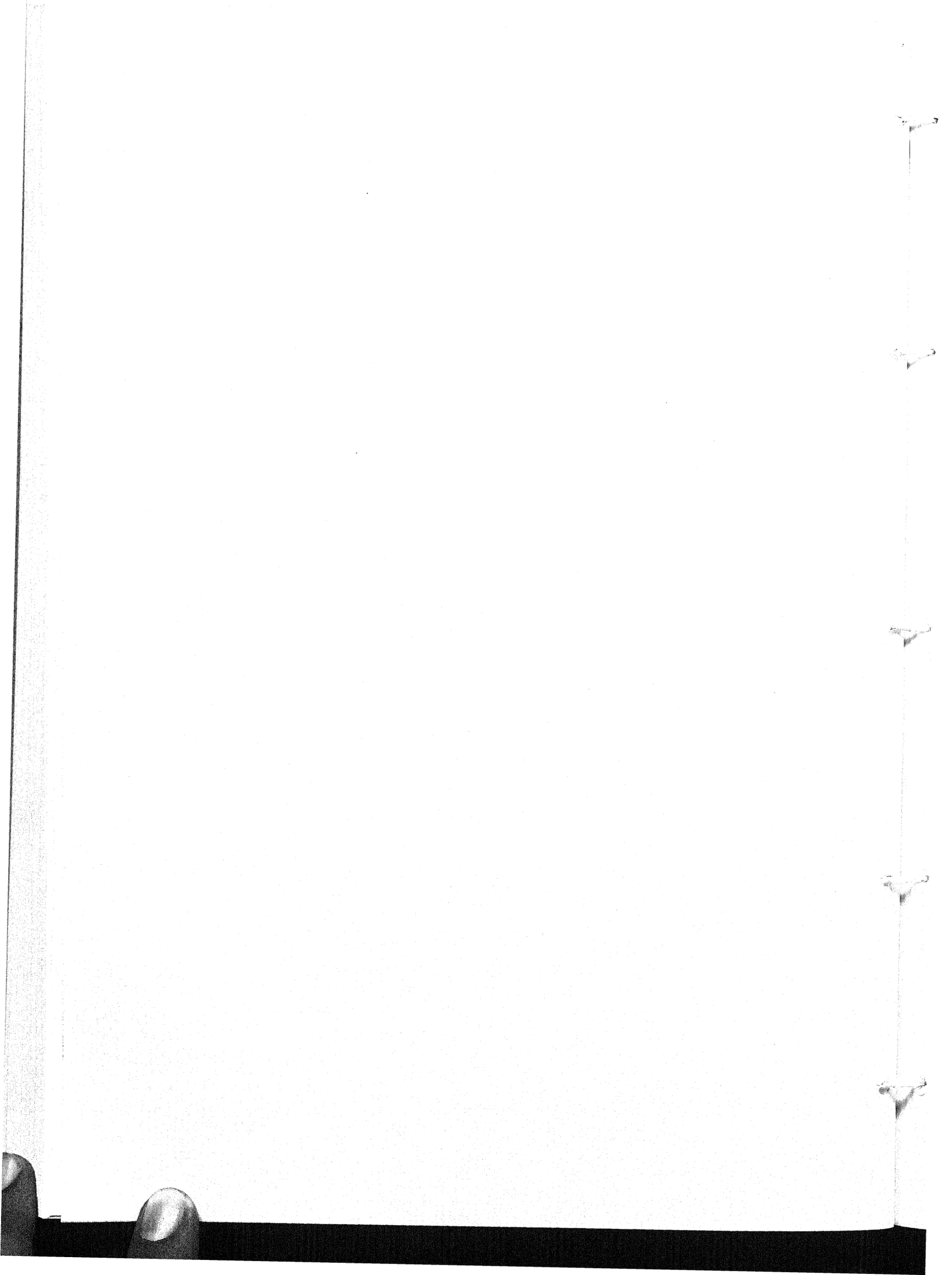
S. SUBRAHMANAYAM
P. APARNA
C. DURGA

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Agricultural Crisis in Andhra Pradesh: Causes and Remedies

S.Subrahmanayam, P. Aparna and C. Durga

Though the policy makers set a high target of 4 per cent growth per annum for the agricultural sector, the sector has got low priority in the economic agenda of the country in the post-reform period. This is reflected in low public investment in agriculture and the consequent deceleration in the growth of this sector. With the establishment of the World Trade Organisation, the member countries, including India, have an obligation to reduce support to agriculture and this has also affected the sector by adversely affecting the prices of certain agricultural commodities. All the states, except Karnataka and Jammu and Kashmir, suffered not only deceleration in growth, but also high fluctuations in output. In this context, this paper examines the performance of Andhra Pradesh agriculture during the last fifty years with a focus on the post-reform period and identifies the problems the sector is facing. Since Andhra Pradesh is the state with a high incidence of farmers' suicides, there is an urgent need to identify and implement remedial measures.

The paper is divided into five sections. Section 1 focuses on the growth performance at the aggregate as well as the crop level during the last fifty years starting from 1955-56 and identifies the problems the sector was confronting during the 15 years of post reform period. Section 2 attempts to identify the factors responsible for deceleration. Section 3 throws light on the constraints that the cultivators in the state are facing. Section 4 identifies the interventions needed to pull the sector out of these problems.

1.1 Aggregate Growth Performance of Agriculture

One of the measures of agricultural performance is the growth of GDP from agriculture and allied sectors. But it does not reflect the poor performance of the crop sector because of the relatively higher growth of the allied sectors like dairy, poultry and meat because of the diversification will make the overall growth high. Based on this measure, the growth rate of Andhra Pradesh agriculture decelerated slightly from 2.29 per cent in the pre-reform decade to 2.15 per cent in the post-reform decade. Though the extent of decline is not high, the growth rate in the later period is not statistically significant, indicating that the instability is high.

If we consider only agriculture, excluding the allied sectors, the share of agriculture in the Net State Domestic Product declined steeply from 26.7 percent in 1993 to 14.12 percent in 2005-06, relegating agriculture to almost insignificance. In order to have a better understanding of the performance of the crop sector, 19 major crops in the state are considered and their growth performance during the last five decades is analyzed. The period of 50 years is divided into four distinct sub-periods. The first period extends from 1955-56 to 1966-67 and this period represents the pre green revolution period. The second period extends from 1966-67 to 1980-81, which is generally called the green revolution period. The green revolution technology was initially introduced in areas where irrigation is available. The third period extends from 1980-81 to 1990-91, during which period the green revolution technology was spread to other areas with the development of irrigation in those areas. The last period covers the period from 1991-92 to 2004-2005.

Growth rate of aggregate crop output is estimated by using the Divisia output index for the major 19 crops. It is a chain index and allows for change weights. Further, it uses geometric average, unlike Laspyres index, which uses base year value share as the weight to each crop. Laspyres index underestimates the output of the crops whose prices are rising since their production will also rise, but they get only base year weights. Once the base is changed, we get a higher growth rate for the same period. The growth rate of output is calculated from semi-log trend equations fitted for the Divisia output index for the entire period and for each of the sub-periods (Table 1).

Table 1: Growth Rates of Aggregate Crop Output

(Percent)

Period	Growth Rate	t value
1955-56 to 1966-67	3.25	4.77
1966-67 to 1979-80	3.87	5.40
1980-81 to 1991-92	2.66	2.34
1991-92 to 2004-05	0.37	0.37
1955-56 to 2004-05	**2.54**	**17.99**

Based on semi-logarithmic trend equations estimated for the Divisia index of output

The results indicate that there are three distinct phases in the growth performance of Andhra Pradesh agriculture. The first phase is the high and accelerated growth phase which covers the pre-HYV period and the first phase of HYV period. The growth rate was high in the pre-HYV period at 3.25 per cent per annum and it further accelerated to 3.87 per cent in the

HYV period. The decade of eighties, which is generally called the second phase of green revolution, witnessed steep deceleration in growth, but the growth rate is still high and respectable. The growth rate declined from the high level of 3.87 per cent to 2.66 per cent per annum, but still it can be considered as a respectable growth rate as it was significantly higher than the population growth rate. In contrast to this experience of moderate to high growth for a long period of 35 years, the period of economic liberalization witnessed steep fall in the growth rate. The growth rate is not only very low, but also statistically insignificant. This is the only period in the long history of 50 years that the growth rate is not statistically significant. This period can be designated as the period of stagnant and unstable agriculture. Despite this poor performance during the last 15 years, the long period growth is also high at 2.54 percent per annum, because of the high growth performance of in the earlier years.

In order to understand the period from which this deceleration started and became steep, growth rates for the post-reform period have been computed by adding one year each time from 1999-2000 onwards (Table 2). The deceleration in growth was mild till 2001, but and the growth rate was 2.40 per cent per annum. But in the last three years, the decline in the growth rate is very steep and is also statistically insignificant. Thus, the crisis, which started in the nineties, became serious in the subsequent years.

Table 2: Growth Rates of Aggregate Crop Output in the Post-reform Period

(Percent)

Period	Growth Rate	t value
1990-91 to 2000-01	2.40	2.52
1990-91 to 2001-02	2.39	3.01
1990-91 to 2002-03	0.84	0.76
1990-91 to 2003-04	0.42	0.43
1990-91 to 2004-05	0.31	0.36

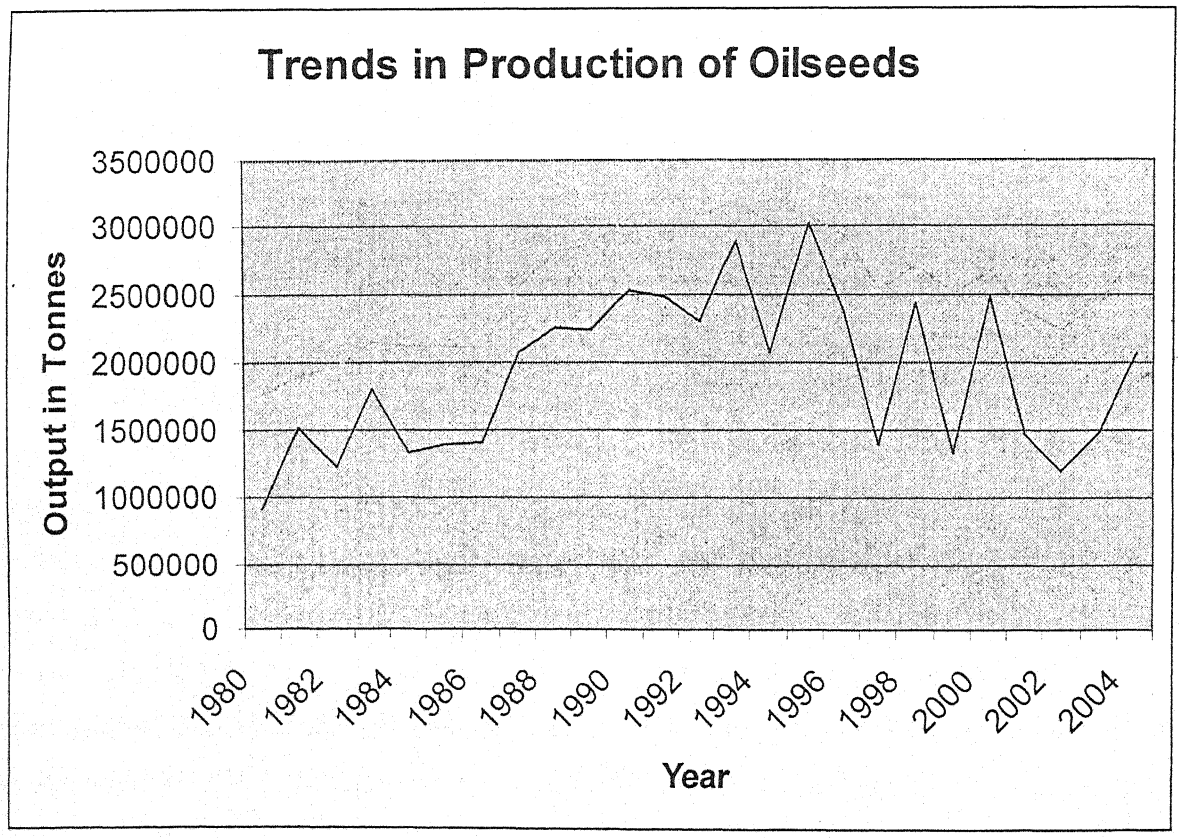
Based on semi-logarithmic trend equations estimated for the Divisia index of output

1.2 Growth Performance of Major Crops

We examine the performance of individual crops in the nineties so that the crops that are responsible for deceleration can be identified. Exponential growth rates have been computed for each sub-period (Table 3). Rice, which accounts for a quarter of the gross cropped area showed a poor performance in the nineties. The growth rate of rice production fell to 0.36 per cent in the nineties from a high growth rate of 2.7 to 3.9 percent in the earlier periods. Among cereals, only maize showed a high growth rate even in the nineties. The production of maize increased at a

high rate of 8.9 per cent per annum. The long rung run growth rate of production is also very high at 5.42 per cent per annum. But all the other coarse cereals namely, jowar, bajra and ragi declined at a high rate both in the eighties and the nineties. As a result of this the growth rate of cereals is only 1.94 per cent per annum during the last fifty years and in the nineties the growth rate is as low as 1.08 per cent per annum.

While the growth rate of cereals declined, the growth rate of pulses picked up from 19880-81 onwards and a high growth rate of more than 4 per cent was maintained. The long run growth rate of 3.18 per cent per annum for pulses is really a good achievement in the state. The more serious situation is that of oilseeds, especially groundnut. It is a major crop in the state and occupies second position in the cropping pattern of Andhra Pradesh, rice being the first. The crop showed excellent performance only in the eighties with a growth rate of 7.29 per cent per annum. In all the other sub-periods, the crop witnessed decline in production and the rate of decline is the highest in the nineties at 5.64 per cent per annum. Thus, the poor performance of oilseeds is partly responsible for the deceleration of agricultural growth in the state in the post- reform period. The production of oil seeds has come back to the level of mid-eighties after continuous decline in the post-reform period (Fig. 1).



Third important crop in the state is cotton with a high share of 7.7 per cent in the gross cropped area. It showed a high growth performance since mid-sixties. However, there is steep deceleration in the growth rate of production. The growth rate of production of cotton was as high as 10.33 per cent per annum in the HYV period and it slipped to 4.61 per cent in the eighties and further to 2.65 per cent in the post-reform period. The long run growth rate of cotton production is 6.96 per cent, the highest among all the crops. This should be viewed against the fact that incidence of suicides is highest among the cotton farmers. Chillies and onion also showed exceptionally good performance both in the eighties and the nineties. Thus, the growth performance of the individual crops indicates that except maize, all other cereal crops and oilseeds showed a very poor performance in the nineties.

Table 3: Growth Rate of Production of Major Crops

(Percent)

Crop	Annual Exponential Growth Rate for the Period				
	1955-56 to 1966-67	1966-67 to 1980-81	1980-81 to 1991-92	1991-92 to 2004-2005	1955-56 to 2004-2005
Rice	3.25***	3.87***	2.66**	0.36	1.74***
Jowar	-0.47	0.89	-5.74***	-2.44**	-1.91***
Bajra	-0.22	1.10	-8.82***	-2.89	-2.93***
Ragi	0.31	1.69*	-4.43***	-5.32***	-2.28***
Maize	5.89***	6.26***	-0.55	8.88***	5.42***
Cereals	**2.23*** **	**3.30*** **	**1.27**	**1.08**	**1.94*** **
Redgram	5.80***	-5.33***	5.49**	7.20***	2.56***
Blackgram	4.15***	6.20***	14.11***	-0.30	5.89***
Bengalgram	-6.32***	-0.85	8.66***	18.95***	4.24***
Greengram	0.41	6.06***	-3.11	-1.43	2.67***
Horsegram	-1.66	1.63	-5.48***	-4.66***	-2.14***
Pulses	**0.80**	**2.66****	**4.71*** **	**4.13*** **	**3.18*** **
Foodgrains	**2.17*** **	**3.27*** **	**1.45**	**1.30**	**2.01*** **
Ground Nut	-4.12***	-0.08	7.29***	-5.64**	1.71***
Gingely	-0.82	-5.17***	-0.65	-2.02	-0.98***
Castor	-0.46	-5.02*	7.02***	2.80	1.14
Oil Seeds	**-3.78****	**-0.46**	**7.72*** **	**-4.27****	**1.95*** **
Sugarcane	6.06***	0.42	0.64	1.08	1.64***
Cotton	-0.25	10.33***	4.61*	2.65**	6.96***
Tobacco	2.20*	0.32	0.42	-2.55	0.67*
Chillies	1.02	2.20	7.27***	6.56***	4.42***
Onion	-4.40***	-1.43	3.49***	8.13***	3.04***

*** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level

1.3 Trends in the Yields of Major Crops

Since production of a crop may decline because of shifts in cropping pattern, growth rate of yields is a better indicator of the performance of a crop. The results do not give any clear indication of high deceleration in the growth rates of crop yields (Table 4). The growth rate of rice yield has decelerated marginally in the nineties over the eighties. The yield of groundnut experienced negative growth and that of cotton showed very poor growth. However, these growth rates of yield cannot lead to such a steep deceleration in the growth rate of aggregate output. What are the causes for the steep fall in the growth rate of agriculture?

Table 4: Growth Rate of Yield of Major Crops

(Percent)

Crop	1980-81 to 1991-92	1991-92 to 2004-05
Rice	1.96***	1.67***
Jowar	0.23	2.66***
Bajra	-0.76	1.34
Ragi	-1.40	2.99
Maize	0.93	0.61
Redgram	-0.21	3.75***
Blackgram	7.67***	-.55
Bengalgram	3.70	3.47*
Greengram	-1.75	-0.47
Horsegram	2.04	1.41
Ground Nut	2.02	-2.00
Gingely	-4.76**	-0.77
Castor	4.74*	2.50**
Sugarcane	-2.96**	-0.12
Cotton	-2.92	0.25
Chillies	6.32***	5.06***
Tobacco	2.16*	1.14
Onion	0.70	4.43***

*** significant at 1 percent level, ** significant at 5 percent level,
* significant at 10 percent level

Before taking up this issue of factors responsible for deceleration, we examine the changes in the cropping pattern in the pre- and post-reform periods (Table 5). Two major changes occurred in the cropping pattern in the eighties. The share of cereals in the cross cropped area declined because of the steep fall in the area under coarse cereals namely, Jowar, bajra and ragi. Secondly, the area under oilseeds increased steeply. The share of oilseeds increased from 14.7 per cent during the TE 1982-83 to 24.1 per cent during the TE 1992-93. In the post-reform period, the share of oilseeds declined and the share of

pulses increased. These changes can be related to changes in the relative prices of agricultural commodities.

Table 5: Changes in Cropping Pattern

Crop	Triennium Averages				
	1955-58	1965-68	1980-83	1990-93	2002-2005
Rice	23.1	26.3	29.1	29.6	24.4
Jowar	20.8	19.9	16.8	8.5	4.9
Bajra	5.0	4.7	4.1	1.5	0.9
Ragi	2.5	2.6	2.0	1.2	0.6
Maize	1.6	1.8	2.6	2.4	5.2
Cereals	**53.1**	**55.3**	**54.5**	**43.1**	**35.9**
Redgram	1.3	1.4	1.9	2.6	3.9
Blackgram	1.0	1.4	1.8	4.2	4.3
Bengalgram	1.0	0.6	0.4	0.5	3.2
Greengram	3.1	3.6	4.5	3.9	4.4
Horsegram	3.8	3.0	2.4	1.1	0.6
Pulses	**10.1**	**10.1**	**11.0**	**12.2**	**16.4**
Foodgrains	**63.2**	**65.3**	**65.5**	**55.4**	**52.3**
Ground Nut	10.5	10.1	11.2	18.5	13.2
Gingely	2.2	1.9	1.4	1.3	1.3
Castor	2.6	2.2	2.2	2.4	2.2
Oil Seeds	**15.2**	**14.3**	**14.7**	**24.1**	**20.5**
Sugarcane	0.6	1.0	1.3	1.5	1.8
Cotton	3.1	2.4	3.5	5.5	7.7
Tobacco	1.3	1.5	1.6	1.4	1.0
Chillies	1.3	1.4	1.3	1.7	1.9
Onion	0.2	0.1	0.1	0.2	0.2

2. Factors responsible for the crisis

2.1 Neglect of Irrigation Infrastructure

I should be noted that several factors were responsible for the crisis in Andhra Pradesh agriculture. We begin with the changes in land and water resources. Triennium averages are computed in order to remove fluctuations (Table 6). Area under cultivation declined steeply in the nineties. While net area sown declined from 110.4 lakh hectares to 100.9 lakh hectares, gross cropped area declined from 127.9 lakh hectares to 121.5 lakh hectares. Irrigated area also

declined to the extent of about six lakh hectares during the period. Further, instability in the area under cultivation has been increasing continuously since 1955-56 (Table 7).

Table 6: Changes in Cropped Area and Irrigated Area

(Lakh Hectares)

Year	Net Cropped Area	Gross Cropped Area	Net Irrigated Area	Gross Irrigated Area
TE 1957-58	112.26	122.49	27.8	33.2
TE 1980-81	108.73	125.61	34.5	44.3
TE 1990-91	110.42	127.91	43.5	54.2
TE 2004-05	100.87	121.48	37.1	47.7

Table 7: Coefficient of Variation of Cropped Area

(Percent)

Period	Gross Cropped Area	Net Cropped Area
1955-1980	3.61	2.91
1980-1990	4.92	3.96
1990-2004	4.29	4.14

While the irrigated area was growing at an annual rate of 1.06 per cent per annum, it was declined at 0.31 percent in the nineties. The post-liberalisation period is unique with decline in area under cultivation and irrigated area. There is a need to identify the areas affected and the factors responsible for it. In the pre-HYV period new irrigation potential was created as a result of which net irrigated area expanded at an annual rate of 2 per cent per annum (Table 8). In the post-HYV period, modernization schemes were implemented as a result of which gross irrigated area expanded, though there was not much expansion in the net irrigated area. In the decade of eighties, irrigated area expanded at a very high rate, but it is only due to exploitation of ground water. The nineties witnessed disaster for the irrigation sector. There is decline in the irrigated area during this period. While net irrigated area declined at an annual rate of 0.49 per cent per annum, gross irrigated area declined at an annual rate of 0.31 per cent per annum. An examination of the changes in the source-wise irrigated area in the nineties will reveal the factors responsible for this fall.

Table 8: Growth Rates of Gross and Net Irrigated Area

(Percentages)

Period	Gross Irrigated Area	Net Irrigated Area
1955-56 to 1966-67	1.30***	1.99***
1966-67 to 1980-81	1.18***	0.63
1980-81 to 1991-92	1.81**	2.04**

1991-92 to 2004-2005	- 0.31	-0.49
1955-56 to 2004-2005	1.06***	0.88***

*** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level

Table 9 provides information on the year-wise changes in the irrigated area since mid-nineties. The decline in irrigated area was caused by both surface and ground water sources. While area irrigated by canals declined by about 4 lakh hectares, area under tanks declined by about 3 lakh hectares. Though area irrigated under wells and bore wells also declined, there is no proper data on this aspect. No information is collected about the performance of wells. However, many micro-level studies indicate that a number of wells dried up and became non-functional. The unsustainable growth of ground water exploitation led to drying up of wells. This is compounded by monsoon failures during the periods. Thus, the neglect of surface irrigation sources is the main reason for the crisis in Andhra Pradesh agriculture.

Table 9: Source-wise Gross Irrigated Area

(Lakh Hectares)

Year	Canals	Tanks	Wells	Others	Total
1995-96	20.56	8.39	22.03	2.06	53.04
1996-97	21.99	9.69	23.91	2.23	57.82
1997-98	20.48	6.14	23.06	1.90	51.58
1998-99	22.86	9.28	26.44	2.34	60.92
1999-00	22.08	7.19	25.95	2.24	57.46
2000-01	22.02	7.98	26.93	2.23	59.16
2001-02	20.89	6.34	26.18	2.08	55.49
2002-03	14.52	4.54	24.79	1.51	45.36
2003-04	15.13	5.38	25.73	1.57	47.81
2004-05	17.30	5.15	25.63	1.79	49.87

2.2 Rainfall and agricultural crisis

Since a major part of the cropped area in the state has no irrigation, rainfall has a significant impact on the agricultural situation in the state. It may be possible that frequent failure of monsoon may also be responsible for the crisis situation. Since south-west monsoon is important for the state, average annual rainfall and coefficient of variation in the monsoon rainfall are computed for each decade. The average annual rainfall in the monsoon season was all time low in the nineties at 586 mm as against 684 in the previous decade. The variation across years was also not high indicating that it was low uniformly in all the years. Thus the decade of nineties witnessed severe droughts in the state (Table 10).

When the years are classified on the basis of the extent of deficit in the rainfall, it is found that the nineties suffered most with nine years out of ten suffering deficit from the normal rainfall in the monsoon-season and as many as five of these nine years suffered severe and high deficit (Table 11). Though the seventies also suffered frequent drought conditions, the situation was not as severe as in the nineties.

Table 10: Average Rainfall and its Instability in South-west Monsoon

Period	Average (mms)	Coefficient of Variation (%)
1960s	617	13.4
1970s	596	22.4
1980s	684	27.7
1990s	586	19.0

Table 11: Extent of Deficit in South-west Monsoon Rainfall

Period	Total No. of Years	Years of Deficit	Severe Deficit	High Deficit	Moderate Deficit	Low Deficit
1960s	10	4	1	1	1	1
1970s	10	6	2	3	-	1
1980s	10	5	-	3	1	1
1990s	10	9	1	4	3	1

Severe: more than 25% deficit; High: 15-25% deficit; Moderate: 10-15% deficit; Low: less than 10% deficit

2.3 Trends in the Prices of Major Crops

Though terms of trade have turned favourable to agriculture as compared to industry, it is mainly due to the minimum support prices (C .H. Hanumantha Rao). As MSP operations are limited to only a few commodities, prices are not favourable to certain commodities. The high imports of edible oil led to decline in the price of oil, which affected the drought-prone areas in the state. In order to understand the changes in relative prices of agricultural commodities, Divisia price index is computed for the major 19 commodities and growth rates of prices of individual commodities are compared with the growth rate of the Divisia index.

The aggregate price index has grown at an annual rate of 4.83 per cent per annum (Table 7). The prices of all the coarse cereals have grown at less than 4 per cent per annum. Maize has become an important crop in the drought prone areas of the state in recent times. Its production is growing at a high rate. But its price is growing only at 3.99 per cent as compared to the overall price increase of 4.83 per cent per annum. The shortfall in the relative price is more than 12 per

cent for these commodities. The price of rice has also grown at a rate lower than the overall average. Prices of pulses have shown a higher growth than the overall average. The price of cotton was also relatively lower than those of other agricultural commodities. Sesame and groundnut also lagged behind other prices.

Table 12: Growth Rates of Prices

(Percent)

Crop	1991-92 to 2004-05	Percentage Shortfall from overall (if any)
Rice	4.46***	7.7
Jowar	3.99***	17.4
Bajra	2.58***	53.3
Ragi	4.26***	11.8
Maize	3.99***	17.4
Redgram	5.11**	-
Blackgram	4.88**	-
Bengalgram	5.08***	-
Greengram	4.51***	6.4
Horsegram	5.35***	-
Ground Nut	4.22***	12.6
Gingely	2.36**	51.1
Sunflower	2.29**	52.6
Castor	5.63***	-
Sugarcane	5.48***	-
Cotton	3.17**	34.4
Chillies	0.07	98.5
Tobacco	6.98***	-
Onion	3.80*	21.4
All Major Crops	**4.83*** **	-

*** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level

2.4 Declining Capital Formation in Agriculture

Efficient allocation of resources, high rate of capital accumulation and technological progress are the sources of growth of an economy. Capital accumulation is the most critical of these three factors, as high capital accumulation is needed to create new technologies or to adopt existing technology developed elsewhere or to achieve efficient allocation of resources. However, technological improvement has to accompany capital accumulation in order to keep the rate of return to capital from falling to zero. The experience of Soviet Union reveals that

moribund technology will not lead to growth even in the presence of high capital accumulation as the rate of return to capital falls to zero (Mcarthur and Sachs, 2002).

Capital formation has become all the more important in recent times with the development of the endogenous growth theory, which shows that high capital accumulation will lead to high growth both in the short run and the long run. The traditional growth model (neo-classical growth model) shows that each addition of capital is assumed to generate a diminishing amount of extra output. The new growth theory assumes that either investment does not have diminishing returns or that some of the extra output is used in activities that directly increase the rate of technical change and economic growth. Empirical results also support the hypothesis that investment is the major source of growth. The results based on the cross-country analysis show that capital contributes more than 40 per cent to the growth of output in developing as well as high-income countries whereas labour and total factor productivity together contribute about 60 per cent (UNIDO, 1997)

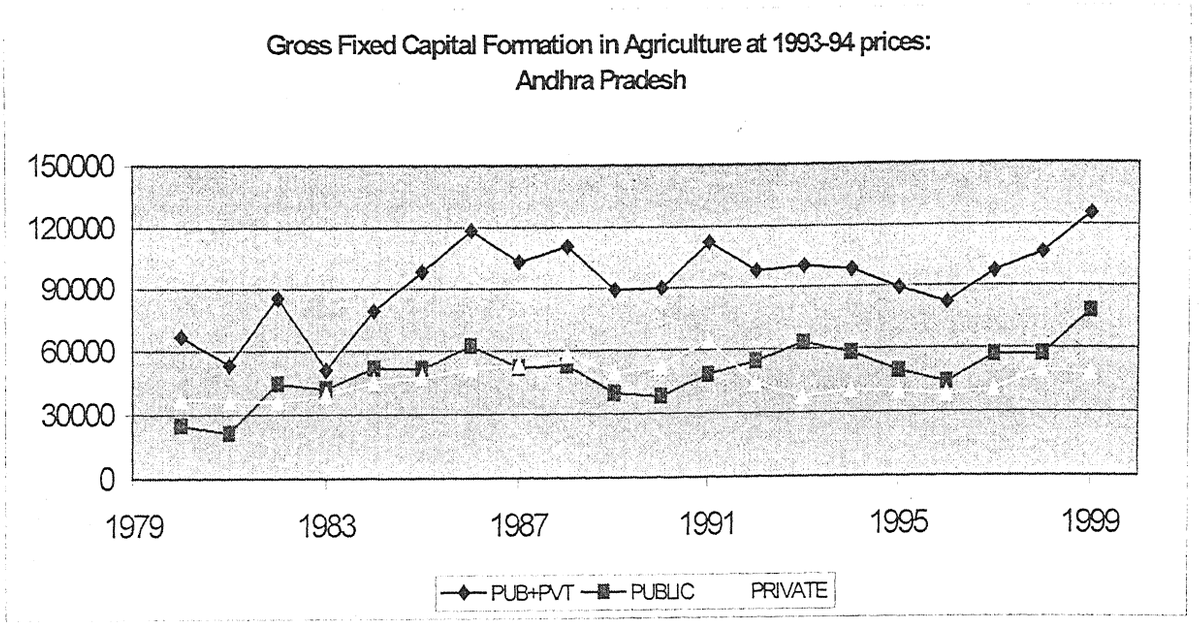
Growth rates of gross fixed capital formation worked out from semi-log trend equations for the eighties and the nineties are presented in Table 1. While agriculture showed improvement in the growth rate of investment in the nineties after experiencing negative growth in the eighties at the national level, the growth rate in the state slipped from a high value of 6.9 per cent in the eighties to 1.1 per cent in the nineties and even this low growth rate is not statistically significant. The growth rate of GFCF in the tertiary sector accelerated from 2.0 per cent (not statistically significant) to a value of 7.2 per cent per annum in the state while the growth rate at the national level decelerated from 5.0 per cent to 4.3 per cent per annum. The secondary sector experienced steep deceleration in the growth rate in the state while it experienced significant acceleration at the national level. The poor performance of secondary sector in the state in the nineties requires special attention. While the manufacturing sector experienced acceleration, the other two sectors viz., electricity, water, gas and construction, showed steep deceleration in growth of GFCF in the nineties. These are the infrastructure sectors involving mostly public investment. The deceleration in the growth of these sectors will have adverse implications for future growth of income. Finally, the slow improvement in the investment climate in the state is contributed by the poor performance of three sub-sectors namely, agriculture; electricity, gas and water; and construction in the nineties.

Table 13: Annual Growth Rates of Gross Fixed Capital Formation

Industry of Use	Andhra Pradesh		India	
	1980-81 to 1989-90	1990-91 to 1999-00	1980-81 to 1989-90	1990-91 to 1999-00
Agriculture	6.9**	1.1	-1.0***	2.0*
Manufacturing	4.1***	8.3**	5.1**	10.0*
Primary	6.9*	1.0	2.2*	0.5
Secondary	8.6*	5.6*	5.6*	8.2*
Tertiary	2.0	7.2*	5.0*	4.3*
All Sectors	5.2*	5.8*	4.7*	5.8*

** Significant at less than 1% level; ** significant at less than 5% level and *** Significant at less than 10% level*

Liberalisation of non-agricultural sectors including trade and exchange rate liberalisation would result in higher incomes to the farmers and this, in turn, would result in higher investment in agriculture (Rao, 1995). The distinguishing feature of the Indian agricultural sector is the stagnation in investment in the eighties. Mishra and Chand (1995) found that after growing at an accelerated rate for three decades after independence, capital formation in Indian agriculture showed a declining trend in the eighties. Alagh (1997) argues that there is no decline in the eighties except fluctuations. Dhawan (1996) showed that capital formation in agriculture stagnated since 1980-81 if two years, with unusually high values (1978-79 and 1979-80) are ignored. Our results, as shown in Table 13, indicate decline in investment in the eighties and a small revival in the nineties with a growth rate of 2.0 per cent annum at the national level. But Andhra Pradesh agriculture showed the opposite pattern of high growth in GFCF in the eighties and almost stagnation in the nineties.



Complementarity between Public and Private Investment

The growth rate of aggregate investment in the public sector decelerated marginally from 6.1 per cent in the eighties to 5.2 per cent in the nineties. This decline is compensated by acceleration in the growth rate of investment in the private sector from 4.4 per cent to 6.3 per cent per annum.

Table 14: Growth Rates of GFCF in Andhra Pradesh: Public and Private

Industry of Use	Public Sector		Private Sector	
	1980-81 to 1989-90	1990-91 to 1999-00	1980-81 to 1989-90	1990-91 to 1999-00
Agriculture	7.6**	3.9***	5.2*	-1.7
Manufacturing	15.8**	13.2*	2.8	8.4**
Primary	9.1*	-0.6	4.5**	3.2**
Secondary	11.8*	4.6***	6.9**	6.4**
Tertiary	1.6	4.1**	2.8**	9.2*
All Sectors	6.1*	5.2*	4.4*	6.3*

** significant at less than 1% level; ** significant at less than 5% level*
**** significant at less than 10% level*

Thus, there is no complementarity between public and private investment at the aggregate level. But agricultural sector shows significant complamentarity between public and private investment. The growth rate of public sector investment in agriculture declined from 7.6 per cent

in the eighties to 3.9 per cent in the nineties. The growth rate of private sector investment declined from 5.2 per cent to –1.7 per cent. The growth rate of private sector investment is always lower than that of public sector investment (Table 14). Thus, the major problem in Andhra Pradesh agriculture is low growth of public investment. In addition to this, the type of investment is also responsible for decline in private investment. Development of irrigation infrastructure is an important source of agricultural growth. Public investment is needed for improving surface irrigation. Though the nineties witnessed positive growth in GFCF in agriculture, the investment did not go for development of irrigation. In order to understand the complementarity between public and private investment, private investment is regressed on public investment using double-log model (Table 15). It is found that the complementatarity exisited in the eighties for all sectors except manufacturing and tertiary sectors. But in the nineties, only tertiary sector showed complementarity. Thus, it is not only the quantum of investment, but also the type of investment that determines the complementarity between public and private investment. The nineties witnessed not only decline in the growth rate of public investment but also witnessed shift in the investment pattern. The present pattern of public investment has little link with private investment.

Table 15: Elasticity of Private Investment with respect to Public Investment

Sector	1980-81 to 1989-90	1990-91 to 1999-00	1980-81 to 1999-00
All Sectors	0.57*	0.44	0.92*
Agriculture	0.35**	-0.17	0.19
Primary	0.31***	-0.07	0.43**
Manufacturing	0.01	0.20	0.55*
Secondary	0.58*	0.36	0.94*
Tertiary	0.09	0.97**	1.10*

Note: Estimated from double log model with private investment as dependent variable and public investment as independent variable.

It is difficult to judge the efficiency of investment using the aggregate data because there are lags between investment and income generation. These lags vary over time and also differ across sectors. It is also equally important to see to what extent each sector invests out of its own

income for capital formation. The ratio of investment to net state domestic product (NSDP) is computed using the three-year moving averages of GFCF as well as NSDP for all the sectors (Table 16). For the economy as a whole, the ratio of investment to net state domestic product is only 22.8 per cent in 1999-2000. It has increased till mid-eighties, remained constant till early nineties and started declining from 1992-93 onwards. This trend is quite glaring in agricultural sector. The investment ratio in the agricultural sector increased from 21.2 per cent during 1982-83 to 30.9 percent during 1987-88 and then started declining. The ratio fell to 11.2 per cent by 1997-98. Manufacturing sector also experienced the same trend with investment ratio rising from 30 per cent to 39.8 percent and then falling to 16.7 per cent by 1997-98. The tertiary sector also shows the same trend. Thus, investment from internal funds is getting reduced over time in all the important sectors.

Table 16: Share of Gross Fixed Capital Formation in NSDP of the Sector

(Percentages)

Year (Triennium ending)	Agriculture	Manufacturing	Tertiary	All Sectors
1982-83	21.2	30.0	31.5	21.7
1987-88	30.9	39.8	30.5	26.1
1999-00	13.9	20.1	22.1	22.8

2.5 High Indebtedness and Exploitation of Informal Credit Agencies

Indebtedness is the major problem in Andhra Pradesh in Andhra Pradesh agriculture. The amount of loan outstanding per farmer is Rs. 0.24 lakh per farmer, which the twice the amount at all India level (Table 16). The position of small farmers is worse than that of all other categories. The amount of loan outstanding is Rs. 0.33 lakh as against 0.14 lakh at the national level. Since most of the loans are contracted from private money lenders and traders, the rate of interest they are paying directly and indirectly is also high. It should be noted that implicit rate of interest they are paying comes to a minimum of 60 to 70 per cent. In other words, their interest commitment will be about Rs. 20, 000 per annum. Their income from agriculture cannot be that high in most of the cases.

Table 17: Loans Outstanding per Farmer by Farm Size

Land Possessed (ha)	Andhra Pradesh	India
< 0.1	12362	6121
0.1 to 0.40	12192	6545
0.41 to 1.00	18163	8623
1.01 to 2.00	33043	13762
2.01 to 4.00	29981	23456
4.01 to 10.00	44865	42532
> 10.00	103817	76232
All Sizes	**23965**	**12585**

Source: Situation Assessmement Survey of NSSO, 2003

The distribution of the loan by source clearly shows the dominance of informal sources. The informal sources account of nearly 70 per cent of the total loan outstanding in Andhra Pradesh. The proportion is only about 40 per cent at the national level. Karnataka also shows highly developed institutional credit disbursement with a high proportion of 70 per cent. While Andhra Pradesh farmers get 70 per cent of their loan requirements from informal credit market, Karnataka farmers get 70 per cent of their loan requirements from formal sources. The failure of banks and co-operatives is clearly visible in Andhra Pradesh. Unless the role of money lender and trader is reduced, the crisis in the agricultural sector cannot be overcome. It is striking to find that the prevalence of indebtedness is 82 per cent in the state while it is only 48.6 per cent at the national level.

Table 18: Distribution of Loan Outstanding by Source of Loan

(Percentages)

Source of Loan	Andhra Pradesh	Karnataka	Tamil Nadu	India
Government	1.0	1.9	2.0	2.5
Coop Society	10.4	16.9	23.3	19.6
Bank	20.0	50.1	28.1	35.6
Money Lender	53.4	20.0	39.7	25.7
Trader	4.8	1.9	0.4	5.2
Others	10.4	9.2	6.5	11.4
Total	100.0	100.0	100.0	100.0
Percentage of Indebted households	82.0	61.6	74.4	48.6

Source: Situation Assessmement Survey of NSSO, 2003

2.6 Failure of Extension Services

The situation assessment survey conducted by the NSS reveals that there is great failure of extension in the state. Their awareness about developments in agriculture is very poor Table 12). It is striking to find that only 6 per cent of the farmers are aware of the WTO. Even the proportion of farmers knowing about the MSP is very low. This clearly shows how MSP operations are confined to certain areas only. Participation in crop insurance is also quite low. Only 5 per cent of the farmers in the state insured their crops. It is not due to lack of interest that the farmers are not buying insurance. A large proportion of the farmers are unaware of the programme and another significant proportion of farmers state that the facility is not available. These two categories account for 71 per cent of the total farmers (Table 20). But the state has a highly developed structure of Self Help Groups. The proportion of farmers with membership in SHGs is as high as 17.7 per cent as against only 4.8 per cent at the state level. But there is not much development of the Farmers' Organisations in the state. Only 2.4 per cent of the farmers have membership in Farmers' Organizations. This institutional structure is not properly utilized till now. Recently, attempts are being made to utilize the structure for interventions in marketing of agricultural commodities through local management. The issue is discussed in detail in the next section.

Table 19: Farmers' Awareness about Developments in Agriculture

State	Bio-fertiliser	Minimum Support Price	World Trade Organisation
Andhra Pradesh	11	29	6
Karnataka	22	29	7
Tamilnadu	48	48	12
Kerala	55	61	41
Punjab	7	63	23
All-India	**18**	**29**	**8**

Source: Situation Assessment Survey, 59th Round of NSSO, 2003

Table 20: Reasons for Non-Participation in Crop Insurance Programme

(Percentages)

State	Un-aware	Not interested	Can't pay	Facility absent
Andhra Pradesh	75	10	3	12
Karnataka	54	25	8	13
Tamilnadu	56	33	2	9
Kerala	29	56	5	10

Punjab	20	12	1	67
All-India	**57**	**16**	**3**	**24**

Source: Situation Assessment Survey, 59th Round of NSSO, 2003

Table 21: Membership of Farmers' in Organisations

State	Farmer's Organisations	Self Help Groups
Andhra Pradesh	2.4	17.7
Karnataka	5.2	8.1
Tamilnadu	3.4	12.9
Kerala	10.5	19.9
Punjab	0.3	1.5
All-India	**2.2**	**4.8**

Source: Situation Assessment Survey, 59th Round of NSSO, 2003

3.1 Interventions in Marketing

Maize is a very important crop in Andhra Pradesh and this is the only crop which has grown consistently during the last fifty years in terms of area as well as productivity. The production of maize increased from 7 lakh tones to 15 lakh tones between 1980 and 2003. Further, the crop requires less water and is cultivated even under rain fed conditions. The crop is concentrated in the backward areas of the Telangana region. The region accounts for 80 per cent of the total production in the state. The crop is grown both under rain fed and irrigated conditions. As a result, there is large variation in yield. Though Minimum Support Price is announced every year, the purchase operations are very low and farmers face lots of problems in the market yards. The operations are carried out by the MARKFED. In this situation, the Government of Andhra Pradesh introduced an innovative scheme of decentralized maize procurement with people's participation under the World Bank Programme, Indira Kranti Patham. Uner this scheme, the responsibility of maize procurement is entrusted to SHGs in the village. All the SHGs were federated into Village Organisation. Two committees are formed out of the members of the Village Organisation- Procurement committee and Advisory Committee. The procurement committee will take the responsibility of maintaining the quality of the maize procured. The procured output is sent to Markfed and payments are received. There is no subsidy involved in the scheme. The Village Organisation will get commission for quantity procured and it will be used partly for paying wages to the members of the procurement committee and partly to build up the fund the Village Organisation. Though the is introduced only this year, it was

implemented very successfully. Data collected from some of the procurement centers revealed that it is a viable and sustainable programme. Because of the decentralization of the operations, farmers could avoid many risks and losses. Depending upon the area under maize, the number of procurement centers to be established is determined. It is significant to note that in one district, namely Karimnagar, 90 procurement centers have been established. . The operation has resulted in several socio-economic gains to the small and marginal farmers. A few of these gains are noteworthy. Firstly, the farmers could get out of the problem of price fluctuations with a short span. During the year 2004, the price was high at Rs. 560 only for a few days. But during most of the season, the price was only Rs. 480 per quintal. When the crop is grown under rain fed conditions, yield is very low and unstable. In such a case, market intervention is essential to protect the farmers who are highly vulnerable for exploitation. Thirdly, the gain to the farmer due to price difference is Rs. 80 per quintal. If a marginal farmer is selling 25 quintals, he gains Rs. 2000. But there are many other indirect gains which together are estimated to be another Rs. 2000 per farmer. These indirect gains arise because of the avoidance of loans from money lender/trader as the Village Organisation supplied seed and fertilizer on 50 per cent credit basis. This intervention freed them from high interest rate charged by the money lender/trader and losses due wrong weighing. A marginal farmer definitely comes out of poverty with this improvement in income. The cost of transportation to the market yard is completely avoided and the unit cost will be high for small producers. In order to avoid this small producers preferred to sell to the local trader. The operation generated a lot of employment in the village for men as well as women. Above all, this operation encouraged the SHGs to undertake marketing of other commodities which have no value earlier. For instance, they have undertaken the marketing of neem seed in collaboration with ITC. As there is no discrimination across groups in deriving the benefits, the village political affiliations did not affect the operation.

References

Dhawan, B. D. and S. S. Yadav (1997), "Public Investment in Indian Agriculture: Trends and Determinants", *Economic and Political Weekly*, Vol. 32, No. 14, April 5-11.

Dholakia, R. H. and B. H. Dholakia (1993), "Growth of Total Factor Productivity in Indian Agriculture", *Indian Economic Review*, Vol. 28, No.1, January-June.

Government of Andhra Pradesh (1999), "*Andhra Pradesh: Vision 2020*", State Secretariat, Hyderabad.

Government of Andhra Pradesh (2001), "*Working Paper on Agriculture*", Department of Agriculture.

Government of India (2001), *Economic Survey: 2000-2001,* Ministry of Finance Economic Division, New Delhi, p. 152.

Gulati, A. and Seema Bhati (2001), "Capital Formation in Indian Agriculture: Revisiting the Debate", *Economic and Political Weekly*, Vol. 36, May 19.

Pal, Suresh and Alka Singh (1997), "*Agricultural Research and Extension in India: Institutional Structure and Investments*", Policy Paper 7, National Centre for Agricultural Economics and Policy Research, New Delhi.

Rao, V. M. and R. S. Deshpande (1986), "Agricultural Production: Pace and Pattern of Growth" in Dantwala, M.L (ed), *Indian Agricultural Development Since Independence: A Collection of Essays*, Oxford and IBH, New Delhi.

Rao, C. H. H. (1994), "*Agricultural Growth, Rural Poverty and Environmental Degradation in India*", Studies in Economic Development and Planning, No. 59, Oxford University Press, Delhi.

Sawant, S. D. (1997), "Regional Variations in Agricultural Performance", *Indian Journal of Agricultural Economics*, Vol. 52, No.3, July-September.

Shenggen Fan and Peter Hazell (1997), "Should India Invest More in Less-Favoured Areas?" *EPTD Discussion Paper No. 25*, Environment and Production Technology Division, International Food Policy Research Institute, Washington, D.C.

Alagh Yoginder K. (1997), 'Inaugural Address: Agricultural Investment and Growth', *Indian Journal of Agricultural Economics*, April-June, Vol.52, No.2

EPW Research Foundation (2002), *National Accounts Statistics of India: 1950-51 to 2000-01*, Economic and Political Weekly Research Foundation, Mumbai, India, Fourth Edition

Dhawan B.D (1996) 'Trends and Determinants of Capital formation and Indian Agriculture', *Indian Journal of Agricultural Economics*, Vol 51, No 4, October-December

Government of Andhra Pradesh (2003), *Gross Fixed Capital Formation in Andhra Pradesh: 1993-94 to 2000-01*, Directorate of Economics & Statistics, Government of Andhra Pradesh, Hyderabad

Gulati, Ashok and Seema Bathla (2001), 'Capital Formation in Indian Agriculture: Revisiting the Debate', *Economic and Political Weekly*, Vol 36, No. 20, May 19

Hanumantha Rao, C.H. (1994), "Agricultural Growth, Rural Poverty and Environmental Degradation in India", Studies in Economic Development and Planning, No. 59, Oxford University Press, New Delhi.

John W. Mcarthur and Jeffery D.Sachs (2002): 'The Growth Competitiveness Index: Measuring Technological Advancement and the Stages of Development' in Michael E. Porter, Jeffrey D. Sachs, Peter K. Cornelius, John W. McArthur, Klaus Schwab (eds) *The Global Competitiveness Report* 2001-2002, Oxford University Press, 2002, pp29.

Mishra S.N and Ramesh Chand (1995), 'Public and Private Capital Formation in Indian Agriculture: Comments on the Complementarity Hypothesis and Others', *Economic and Political Weekly*, Vol 30, No 25, June 24

Subrahmanyam S and P. Satya Sekhar, 'Agricultural Growth: Patterns and Prospects' in C.H Hanumantha Rao and S. Mahendra Dev (eds), *Andhra Pradesh Development: Economic Reforms and Challenges Ahead,* Centre for Economic and Social Studies, Hyderabad, 2003 pp 230

UNDP (1997): *Industrial Development: Global Report 1997*, Oxford University Press, 1997 pp9

AGRICULTURAL PERFORMANCE IN KARNATAKA : DURING REFORM PERIOD

By

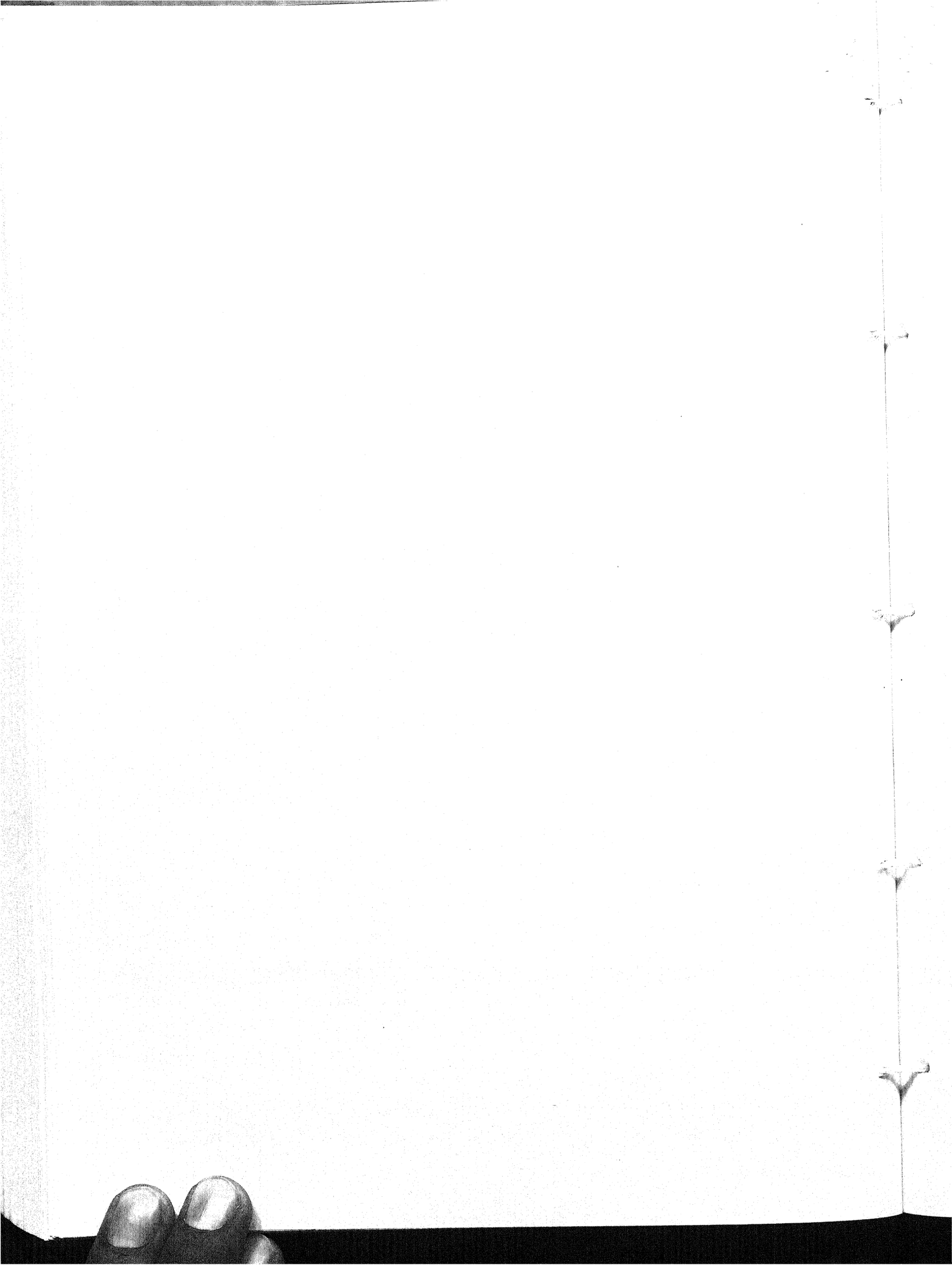
R.S. DESHPANDE
NEELAKANTA N.T.

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Agricultural Performance in Karnataka: During Reform Period

R.S.Deshpande and Neelakanta.N.T*

I. Introduction

Agricultural Performance in Karnataka is characterized by vast steppe of drought-prone region and sporadic patches of irrigated area. Thus a large share of agricultural land of the State is exposed to rainfed conditions with severe agro-climatic and resource constraints. Given this, farmers have no other option but to grow low value- high-risk crops at the cost of an erratic performance. Coexisting with this are a few patches of high-value and high-tech agriculture emerging recently in the State. In an overall analysis agricultural sector of the State is known for its achievements on the growth front despite severe climatic and strong resource constraints. As a consequence Karnataka's agriculture is both diversified and segmented in many ways. It is a matter of deep concern that even though this sector directly impacts the overall growth as well as distribution performance of the State economy. Despite the presence of severe climatic and resource constraints agricultural sector of Karnataka could record satisfactory growth performance to remain at the median level in any cross-section comparison. The State is continuously managing critical developmental efforts and it will enhance to cross the barrier of being at an average level for a long spell. In the present liberalization scenario, Private sector is getting more support from the market as well as policy maker and at the same time it will attracting fresh investment.

II. State Macro Economic Performance

Under the State Macro Economic Performance, there are various factors that show the clear performance of agriculture. Agricultural sector engages more than sixty percent of Karnataka's work force. The Share of GSDP generated from agricultural sector is sliding down at a faster pace than the workforce engaged in the sector. As a*

* Professor and Research Staff respectively in ADRTC, Institute for Social and Economic Change, Bangalore-500 0072. Email ID : deshpande@isec.ac.in

consequence the per capita real GSDP from agriculture is declining. This can be seen **table.1.**[1]

Table.1: Sector Wise Distribution of Gross State Domestic Product at Factor Cost by Industry of Origin 1993-94 to 2000-01 Percent to GSDP

Industry	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Agriculture	33	31	30.3	29.5	25.2	26.8	27.3	25.3
Fishing	0.4	0.6	0.7	0.9	0.8	0.6	0.6	0.6
Primary Sector	36.3	34.5	33.5	33.1	28.9	29.9	30.1	28
Secondary Sector	25.4	26.4	26.3	25.7	27.4	27.6	25.4	25.1
Tertiary Sector	38.3	39.1	40.2	41.2	43.7	42.5	44.5	46.9
Gross State Domestic Product (GSDP) at constant Prices (In Lakhs)	4107906	4791516	5621456	6517572	7304576	8784091	9497193	10449173
Per Capita GSDP at constant Prices (Rs.)	8706	9966	11478	13180	14205	16673	18332	13335

Source: Website on Agriculture Department of Agriculture, Government of Karnataka & Central Statistical Organization.

During the last decade this trend has become sharper than earlier. The share of agriculture in GSDP has decreased from 33 per cent in 1993-94 to 25.3 percent in 2000-01. Although per capita income has shown considerable increase owing to the growth of secondary and tertiary sectors, the per capita GSDP in rural areas from agricultural activities remains at around Rs. 5,372. Therefore, the low-income generations in agricultural sector and increased inter-sectoral inequalities are bare truths and need to be kept in view. In the terms of NSDP also Agricultural sector have much lower than the Secondary as well as Tertiary Sector. At the same time Agricultural sector has the potential to grow equally well, to maintain the balance of life of people living rural and urban areas.

Trade sector is sector, which gave boost to the development of all sectors. In case of Karnataka, it is not much significant but during the last decade and more foreign earnings from farm products. **Table.2** indicates that A quick performance of agricultural trade during last five years.

Table 2: Export Performance of Karnataka State (Value In Rs. Crores)

Commodity	1998-99	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004#
Coffee Products	1043.72	1183.93	957.53	881.42	730.65	532.48
Silk Products	357.90	521.24	772.39	672.24	746.09	675.39
Cashew & Cashew Kernals	238.00	251.55	187.98	163.55	279.83	260.50
Agricultural & Processed Food Products	165.31	195.33	237.91	349.51	366.99	172.40
Spices	60.00	61.00	73.74	69.12	91.65	125.14
Tobacco/Beedi	7.79	16.25	3.23	2.70	3.72	-
Bangalore Rose Onion	-	-	38.62	48.35	39.38	57.99
Gherkins	-	-	-	120.00	139.00	140.70
Flowers**	37.73	40.66	40.00	40.00	42.00	45.00
Total Agri Exports	1910.45	2269.96	2311.40	2346.89	2439.31	2009.60
Total Exports	10039.48	12854.25	16027.46	20145.58	26279.43	26862.91
% of agri Exports in Total Exports		17.66	14.42	11.65	9.28	7.48

Note: ** Quantity in Millions Stems; # Up to December 2003
Source: KAPPEC, 2005

Ups and down are common in every sector like coffee, tobacco and food product are in downward of trade. Consequently, remaining goods have been increasing trend. Growth of non-agricultural goods causes the decline in the export of agricultural goods. Capital formation is become significant after1998-99 and it is also reflect the main indicator of growth of the economy. Although, Intervention of the International donors like IMF, World Bank etc., by implementing high budget projects in Karnataka in the field of rain fed agriculture, watershed development, surface irrigation, Agricultural R & D especially for Agricultural University and the allied agricultural sector.

III. Performance Over Five Decades

Performance of the agricultural sector is analysed from two prominent viewpoints. First, natural point of view is the growth in crop economy and its influence on the aggregate performance of the sector. Second, the input/resources as the strong drivers of production growth are analysed to indicate the direction of growth. Given the predominant rainfed nature of Karnataka's agricultural sector, the staggering growth trends do not strike any surprise. But, probably the State has been

able to internalise these constraints with a well-adjusted crop pattern on one hand and development of resources on the other. Availability of resources and conversion of these inputs to outputs in the production process is certainly a major determinant of growth. The role of resources is therefore crucial especially in the context when the trends in resource depletion become evident.

3.1 Crop Production: Phases of Stagnation and Growth

One can broadly classify five phases of growth and stagnation in Karnataka's agricultural economy. It has seen in the following **Table.3,** which contains the compound growth rate of Food grain, Cotton and Oilseeds.

Table.3.Five decades Compound Growth rate of Crop production

Particulars	1950-51 to1959-60		1960-61 to1969-70		1970-71 to1979-80		1980-81to 1989-90		1990-91 to 1999-00	
	P	Y	P	Y	P	Y	P	Y	P	Y
Foodgrains	4.30	2.83	3.09	2.55	2.07	2.27	0.91	0.18	3.43	2.92
Cotton	5.83	1.38	-2.20	1.02	5.84	-0.62	4.38	0.83	1.60	1.37
Oilseeds	2.39	3.54	0.18	-1.89	0.93	5.47	9.17	12.68	-1.96	2.23

Source:

The first phase that ended in 1959-60, recorded slight growth especially in foodgrains and Cotton sector. This was followed by a strong phase of stagnation in the economy, which ended up in 1969-70, but with a severe drought. The State could pick up the advantages of the technological changes during the third phase and the decade of eighties saw a fluctuating behavior in Karnataka's agricultural economy dominated by foodgrains that highlights the stagnation. Cotton and a few other commercial crops however, picked up slightly during this period. Followed by this during nineties the State witnessed some revival of growth in foodgrains sector but the two major commercial crops (cotton and oilseeds) are showing signs of deceleration. At Same time in **Figure.1** shows the area under jowar and ragi has been declining but that under paddy is increasing. The area share of commercial crops has gone down but that of food grains has increased. It comes out very clearly from the analysis that there is a scope for realignment of cropping pattern based on efficient productivity of different crops across zones. Among these sorghum hybrids can be specially promoted in summer season in irrigated regions.

Figure: 1.Area Shares of Different Crops at Triennium Ending 1997-98

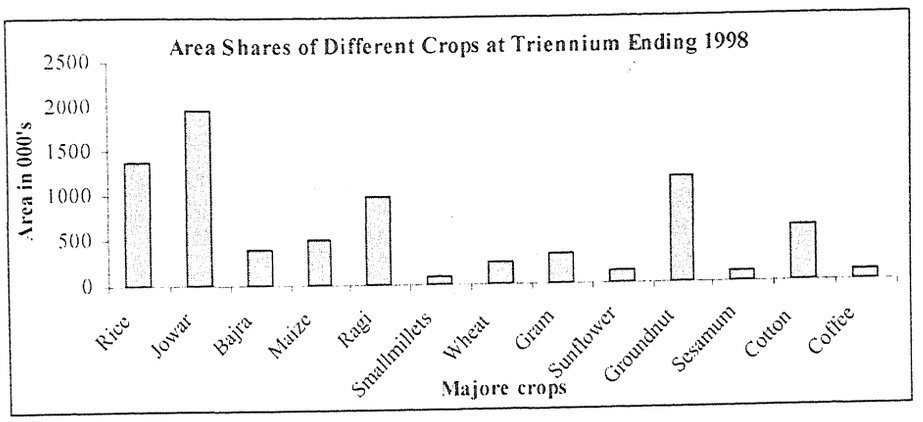
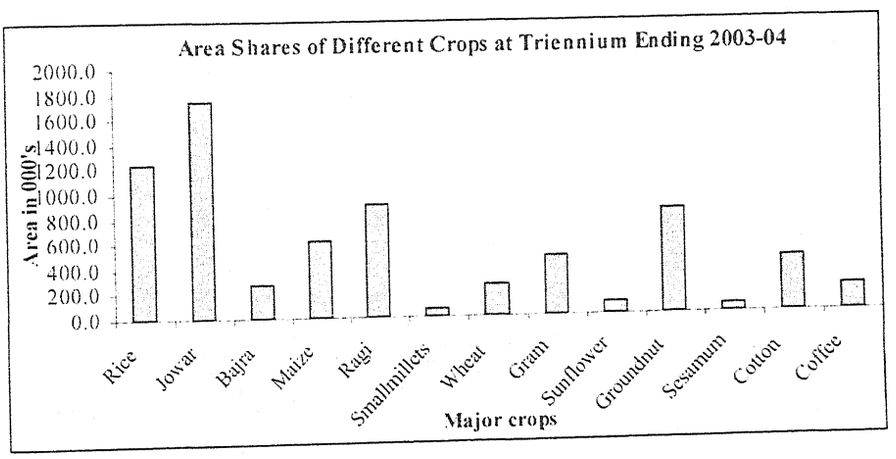


Figure.2: Area Shares of Different Crops at Triennium Ending 2003-04



In order to increase the productivity of pulses and oilseeds, these crops have to be raised in assured rainfall and in irrigated areas to the extent possible. Cotton as well as sugarcane crops have to be tailored to market needs of the crops in terms of quality and demand. However, Jowar and Rice have been dominated in the Area under crop as compare to other crops.

3.2 Utilisation of Land

Land use and policy in Karnataka has been a matter of concern in the recent past. Government of Karnataka recently brought out a document on the Land Use policy. The necessity of such document emerged from five different facets. First, land as a fixed resource, is fast approaching its optimum allocation and therefore there is an emergent need for reviewing the land use pattern. Second, there is a significant

share of utilizable but wasted land resource that has to be brought under economic use. The current fallows reported as 12.9 lakh ha in 1991-92 increased to 16.7 lakh ha in 1997-98 and 17.28 lakh ha. in 2001-02. Third, the pressure of commercialisation caused significant changes in the cropping pattern, and fears are being expressed in some quarters that this may threaten the food security. There is an increase of around 11.44 per cent in the use of land for non-agricultural purposes. Fourth, the demographic pressures and the land reforms together have caused the average size of holding to shrink over the last three decades. This has increased the number of marginal holdings. Lastly, the process of urbanization is also exerting stress on the land use in the urban hinterlands.

Over a period of time the fallow land is growing at the rate of 2.02 per cent per annum. However, in certain years like 1998-99, 1999-00 and 2001-02 the percentage of fallow land reached about ten per cent of the total geographical area (GA) of the State. This was mainly because of the deficient rainfall and also the inability of the Government to provide irrigation facilities in these years.

Table.4. Land Particulars in Karnataka State

Year	Fallow lands to total GA	NSA	Area sown more than once	Total GCA	Cropping Intensity GCA/NSA)%
1990-91	9.17	56.21	13.14	63.6	113.14
1991-92	9.17	54.49	13.27	61.73	113.27
1992-93	9.17	56.21	15.72	65.05	115.72
1993-94	7.88	56.63	15.06	65.15	115.06
1994-95	7.91	56.64	15.23	65.26	115.23
1995-96	8.95	54.7	15.3	63.06	115.3
1996-97	9.04	54.7	14.76	62.77	114.76
1997-98	8.06	55.69	16.44	64.85	116.44
1998-99	10.86	52.89	16.09	61.4	116.09
1999-00	10.86	52.89	16.09	61.4	116.09
2000-01	8.76	55.06	17.37	64.63	117.37
2001-02	10.05	53.85	17.92	63.5	117.92
GR in %	2.02	-0.42	2.52	-0.11	--

Note: NSA – Net Sown Area; GCA – Gross Cropped Area; GA – Total Geographical Area. Fallow Lands, NSA, ASMO and GCA are expressed as percent of the GA.

Source: Various Issues of Karnataka at a Glance, Directorate of Economics and Statistics, Government of Karnataka, Bangalore.

The percentage of net sown area (NSA) to the total GA seems to have been grown negatively at the rate of 0.42 per cent. Although the figure is not statistically significant, but the point of concern is the proportion of NSA to the total GA has been decreasing over years, which is not a development symptom. Because, as it is mentioned already, the population in the State and the country is growing at the rate of about 1.75 per cent per annum, if the NSA declines there will be threat in terms of food security for the State.

3.3 Operational Land Holdings in the State

It is interesting to observe that number of marginal and small holdings are increasing, but the average area operated in all classes of ownership holders is shrinking at faster density of economically non-viable holdings. Number of holdings under 1 hectare have trebled in the three decades (1970-2000). The average size of operated area of all the land size classes is declining **(Table.5)**. This clearly reveals the increasing fragmentation of land holdings in the State and marginalisation of the size of holding. Increasing marginalisation of the size of holding also indicates that the economic viability of large number of small and marginal holders is now more sensitive to the fluctuations associated with natural and market associated shocks.

Table.5. Numbers of Operational Holdings and the Average Area Operated

Particulars Number of Holdings (in 000)	< 1 ha.	1 to 2 ha.	2 to 4 ha.	4 to 10 ha.	10 ha. & Above	Total
1970-71	1081	840	788	623	219	3551
1980-81	1489	1057	918	662	183	4309
1990-91	2262	1586	1163	636	129	5776
2000-01	3252	1909	1259	569	90	7079
% Change per annum	6.69	4.24	1.99	-0.29	-1.96	3.31
Area operated in 000, ha.						
1970-71	549	1221	2205	3792	3601	11368
1980-81	733	1543	2572	4018	2880	11746
1990-91	1072	2308	3200	3770	1971	12321
2000-01	1492	2742	3429	3317	1327	12307
% Change per annum	5.73	4.15	1.85	-0.42	-2.1	0.28
Average Operated area in ha.						
1970-71	0.51	1.46	2.8	6.09	16.43	3.2
1980-81	0.49	1.46	2.8	6.07	15.69	2.73
1990-91	0.47	1.46	2.75	5.93	15.28	2.13
2000-01	0.46	1.44	2.72	5.83	14.74	1.74
% Change per annum	-0.33	-0.05	-0.1	-0.14	-0.34	-1.52

Source: GOK (2003). Agricultural Census (2000-01)

This increased economic fragility due to marginalisation of holding is clearly reflected in the current phase of farmers' distress. The shrinking sizes of holding and high density of unviable farmers are together causing marginalisation in the quality of life also, and that has serious implications. The new phase of land reforms therefore, needs to concentrate on efficient operations in land market, marginalisation of the size of holding, legalising tenancy market and reviewing the policies to encourage larger generation of marketable surplus.

IV. Resource Use

During 1980-2001 the growth in irrigated area by bore wells increased by 33 percent and the number of bore wells by 34 percent. However, the area irrigated per bore well increased only marginally from 2.67 acres in 1980 to 3.93 acres in 2001.

Table.5.Basic Irrigation Infrastructures in Karnataka (1980-1999)

INFRASTRUCTURE	1980	1990	1999
Length of canals (Kms)	5430	4634	5257
Number of lift irrigation schemes	437	24983	7900
Number of electric irrigation pump sets (lakhs)	2.85	7.46	11.46
Number of diesel irrigation pump sets	36468	38517	38019
Gross area irrigated by irrigation open wells (lakh acres)	10.4	16.61	14.14
Gross area irrigated by tube wells (lakh acres)	0.019	5.58	15.31
Gross area irrigated by canals (lakh acres)	18.12	27.08	31.9
Gross area irrigated by tanks (lakh acres)	8.72	6.65	6.79
Gross area irrigated by lift irrigation (lakh acres)	0.73	3.54	3.01
Gross area irrigated by other sources (lakh acres)	3.56	4.95	7.25
Gross area irrigated by all sources (lakh acres)	41.56	64.44	78.42
Net area irrigated by all sources (lakh acres)	33.74	52.25	62.68

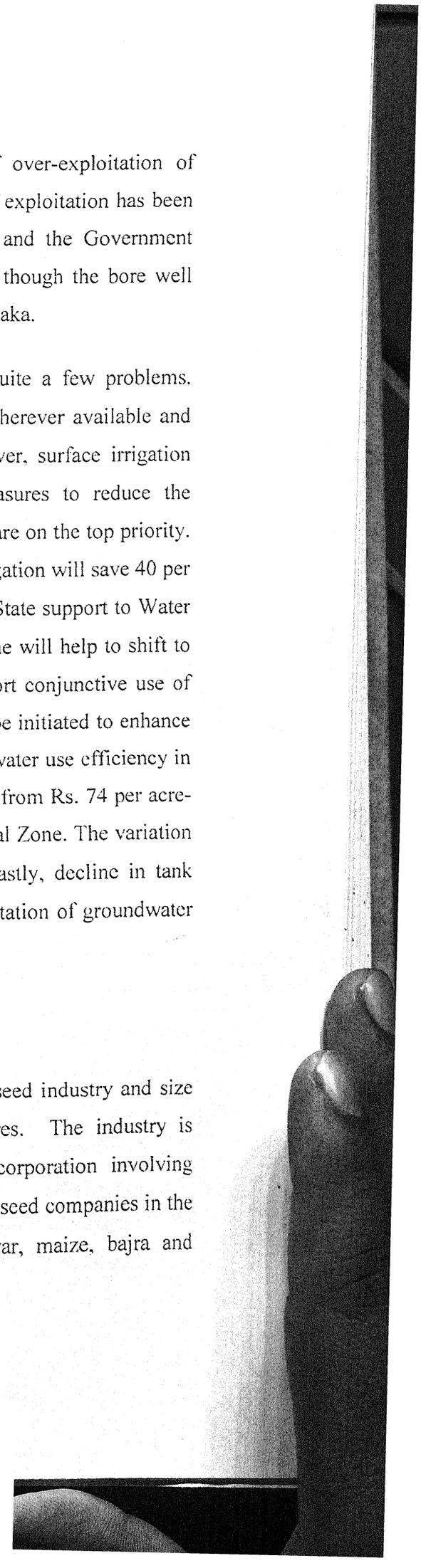
Source: data obtained from Brochure on Irrigation Statistics in Karnataka Directorate of Economics and Statistics, Government of Karnataka, Bangalore

Up to now, 43 talukas have come under the category of over-exploitation of groundwater and in another 29 talukas the 50 per cent limit of exploitation has been exceeded. This precisely is a caution to both the farmers and the Government regarding the limits to groundwater extraction per well, even though the bore well depths are increasing up to 1000 feet in different parts of Karnataka.

Irrigation and water use sector in Karnataka poses quite a few problems. First, in the surface irrigation sector, the over-use of water wherever available and consequent environmental problems are quite visible. Moreover, surface irrigation has its limitations in the form of available potential. Measures to reduce the conveyance losses and over-use of water in the farmers' fields are on the top priority. In the case of paddy, instead of standing water, intermittent irrigation will save 40 per cent water. The legal step taken on 14th June 2000, providing State support to Water Users' Associations in the form of a concrete institutional frame will help to shift to distribution of water on volumetric basis. Second, as a support conjunctive use of water is being encouraged. In addition to these, steps have to be initiated to enhance irrigation literacy rational water and energy prices. Third, the water use efficiency in groundwater irrigation is a matter of serious concern. It varies from Rs. 74 per acre-inch in Southern Dry Zone to Rs. 2,700 in Southern Transitional Zone. The variation is both due to agro-climatic conditions and crop pattern. Lastly, decline in tank irrigation (the recharge engines) on one hand and faster exploitation of groundwater on the other exert pressure on the sector, which needs attention.

4.1 Seeds and Nutrition Management Seeds

Although precise estimates of volume of Karnataka's seed industry and size are not available; it is valued roughly around Rs.400 crores. The industry is participated by both private and public sector companies/corporation involving production as well as marketing of seeds. The share of private seed companies in the high volume low profit crops is minimal, whereas in jowar, maize, bajra and



sunflower the private seed companies have major share. **Table.7** indicates the demand and supply scenario for seeds in 2004-05 indicates a large mismatch between the actual requirement and production/availability in several crops like ragi, jowar, green gram, red gram, groundnut and sunflower.

Table.6. Seeds-Demand Supply Scenario (2004-05) (In Quintals)

Sl No.	Crop	State Requirement	Agency-wise seed supply					Total Govt. Agency	Private	Grand Total
			UAS (B)	UAS (D)	KSSC	NASC	KOF			
1	Paddy	142300	2500	-	83000	10000	-	95500	90860	186360
2	Ragi	22445	600	-	15500	400	-	16500	100	17500
3	Jowar	30500	-	-	4000	350	-	4350	9730	14080
4	Maize	79690	500	25	-	100	-	625	275650	276275
5	Bajra	13340	-	-	1000	200	-	1200	23355	24555
6	Red gram	17930	30	49	4850	200	-	5129	3800	8929
7	Black gram	4705	-	25	5000	400	-	5425	850	6275
8	Cow pea	3900	20	-	500	500	-	1020	2400	3420
9	Green gram	10320	-	50	2300	300	-	2650	1650	4300
10	Ground nut	156520	-	112	7000	750	30000	37862	2000	39862
11	Sun flower	13940	100	100	1150	270	1000	2620	2600	5220
12	Soybean	6320	370	40	3700	400	5000	9510	10600	20110
13	Cotton	7350	-	40	2400	60	-	2500	3588	6088
	Total	510747	4370	779	130400	14030	36000	185429	428163	613592

Source: Department of Agriculture, Govt. of Karnataka.

The State agencies meet only 30 per cent of the total requirement and about 2/3rd has to be met from private initiatives. Therefore, the role of private seed industry is quite strong in the seed market. Keeping in view the strong presence of private seed industry in the sector, one cannot rule out the circulation of spurious material. A complete review of the existing legal framework therefore, is an essential pre-requisite. The TRIPS requirement of WTO will also require the tightening of legal framework. It is a welcome feature that private sector is dominant in the seed supply but then the responsibility of proper and stringent quality of supply need to be ensured by the State agencies. In the context of Nutrient balance, in agriculture in Karnataka is relatively more satisfactory when compared with many other agriculturally leading States in the country except in case of potassium where there is sustainable mining of soil resources. The nutrient ratio ($N:P_2O_5:K_2O$) of fertilizer consumption in the State is 5.1:2.1:1 which is near optimal and much more balanced

than many other States and the country. While, the Pesticide consumption was increased during the period from 1970 to 1990 are well known, due to the Crop habitat diversification, occupation of low pesticide crops and Climate aberrations are causes for declining pesticide consumption from 1990 onwards.

V. Agricultural Allied Sectors

5.1 Horticulture

In Karnataka, horticultural crops occupy about 15.21 lakh hectares of area with an annual production of about 96.60 lakh tonnes. Although the area comprises only 14.25 per cent of the net cultivated area in the State, the total income generated from the horticultural sector accounts to over 40 per cent of the total income derived from the combined agriculture sector.

Table.8. Export of horticultural commodities in Karnataka

Hortil. Product	Qty. in mt.	Value in Rs. lakhs	% Share of value	Destinations
Fresh mangoes	45407.59	7913.67	5.63	UAE, UK, Saudi Arabia, Bangla Desh, Kuwait
Fresh grapes	11525.41	3788.6	2.7	UK, Netherlands, UAE, Bangla Desh, Germany
Other fresh fruits	44820.43	7172.9	5.11	USA, Bangla Desh, Malaysia, Sri Lanka, Singapore
Fresh onion	215693.6	17604.72	12.53	UAE, Malaysia, Singapore, Sri Lanka, Bangla Desh
Other fresh vegetables	64654.63	10233.37	7.29	USA, UAE, Saudi Arabia, Sri Lanka
Walnuts	5327.9	6892.22	4.91	Spain, Germany, USA, France
Mango pulp	38133.73	13856.43	9.86	USA, Saudi Arabia, Netherlands, Japan, UAE
Dried& preserved vegetables	145049.6	38305.29	27.27	Sri Lanka, UAE, USA, UK, Singapore
Pickles & chutneys	21138.05	7595.68	5.41	USA, Saudi Arabia, Netherlands, Japan, UAE
Other processed fruits & vegetables	34322.16	10811.15	7.7	USA, UK, UAE, Netherlands, Saudi Arabia
Fruit & vegetable seeds	6062.38	6633.93	4.72	USA, France, Italy, Japan, Pakistan
Floriculture	18721.06	9660.97	6.88	USA, Netherlands, UK, Italy, France
Total	**650856.5**	**140468.9**	**100**	

Source: Indian Horticulture Database-2000

This accounts for 17 per cent of the GDP of the State. Fruits, vegetables and flowers occupy an area of 3.15, 2.59 and 0.21 lakh ha, respectively. The annual income generated by the horticultural crops amounts to over Rs. 6000 crores. There is considerable gap in productivity of mango (8.2 MT/ha), banana (25.6 MT/ha), sweet orange (7.2 MT/ha), lime/lemon (4.5 MT/ha), mandarin (9.8 MT/ha) and guava (7.4 MT/ha) between Karnataka and other highest productivity States. **Table.8** shows the Karnataka's export of horticultural commodities is about Rs. 1250 to Rs. 1400 crores of which coffee alone contributes Rs. 830 crores followed by cashew worth Rs. 236 crores and horticultural and processed products about Rs. 132 crores. Horticultural exports of the State are covering large number of countries. Horticultural crops contribute 95% of the State's export of agricultural products. Given the growth rates in area under the horticultural crops in the State, one can easily foresee that the State would emerge as one of the major fruit-exporting region of the country, provided the institutional and investment support is conducive for small development.

Karnataka is well known for floricultural production accounting for 24.43 per cent of the country's total area under floriculture in 1999-2000. The area under floriculture has increased from 0.05 lakh hectare in triennium ending 1982-83 to 0.22 lakh hectare in triennium ending 1999-2000. There has been consistent increase in flower exports from Karnataka. The value of exports increased from 37.73 crores in 1998-99 to 45 crores in 2000-2001 accounting for 34 per cent of the total countries total floricultural exports in 20001-2001. The annual compound rates of growth in flowers is 9.53 per cent per annum during 1978-79 to 1999-2000. The production growth mainly comes through area expansion and during this phase the productivity has not increased substantially.

5.2 Sericulture

Karnataka is a major silk producing State with nearly 46.2 percent of share in Indian production out of 14,617 MT during 2002-03. Sericulture in the State is spread over 27 districts with 88,909 ha (2002-03) of mulberry including 17,424 ha under rain fed cultivation. The silk production has steadily increased from about 2,500 tonnes about two decades ago to the present level of over 8,700 tonnes. This expansion has

been mainly attributed to the implementation of World Bank assisted Karnataka Sericulture Project (KSP-I) and KSP-II component of National Sericulture Project (NSP) during 1980'2 and 90's. There has been substantial reduction in the area of mulberry during recent years, which however, is not commensurate with the cocoon and raw silk production indicating higher levels of productivity in recent years. The influx of imported silk is mainly catering to the needs of power-loom sector.

Sericulture sector in Karnataka has demonstrated significant strides during the last three decades. The domestic market demand for silk yarn as well as silk cloth has been increasing at a faster rate. Silk is a commodity consumed largely by the upper income strata of the society and therefore, the income-elasticity of demand is above unity. These strengths of the sericulture industry can make silk as one of the important commodities in domestic as well as international trade of Karnataka.

5.3 Livestock and Fodder

Livestock in the State is a wealth in terms of genetic diversity and its contribution to farming and livelihood systems. Strong complementarities exist between crop cultivation and animal husbandry. The contribution of livestock to the State's gross domestic product (GDP) is steadily increasing in the last two decades. The contribution of livestock sector in GSDP at current prices during 2000-01 was 20.2 per cent and that has increased from 18.4 per cent during 1993-94 to 22.55 per cent at constant (1993-94) prices during 2000-01. But the total cattle population at the State level has decreased by 6.3 per cent between 1990 and 2003, within the total cattle population, indigenous cattle have considerably declined by 16.1 per cent during the period 1990 to 2003, whereas crossbred cows have increased by 122 per cent during the same period. At the same time both sheep and goats' population has increased by 53.5 per cent and 14.9 per cent respectively during this period. The interesting trend in livestock population to be noted from **Table.10** is that between 1997 and 2003 all species of livestock, except crossbred are showing declining trend in their growth.

Table. 10: Composition of Livestock Species in Karnataka (in lakhs)

Sl No	Livestock Species	Year		
		1990	1997	2003**
I	a) Indigenous	94.6 (40.7)	95.4 (33.3)	79.4 (31)
	b) Crossbred	7.2 (3.2)	13 (4.5)	16(6.2)
	c) Total Cattle	101.8 (43.8)	108.4 (37.9)	95.4 (37.2)
II	Buffaloes	40.4 (17.4)	44 (15.4)	40 (15.6)
III	Sheep	47.3 (20.3)	80 (28)	72.6 (28.3)
IV	Goats	39 (16.8)	48.7 (17)	44.8 (17.5)
V	Pigs	3 (1.3)	4 (1.4)	3.1 (1.2)
VI	Others*	1 (0.4)	1 (0.3)	0.5 (0.2)
	Total	232.5 (100)	286.1 (100)	256.4 (100)

Note: Figures in parentheses indicates percentages to total.
*Include Horses, Ponies, Mules, Rabbits and Donkeys (Dogs not included).
** Provisional

Sources: Quinquennial Livestock Census, 1990, 1997 and 2003, DA&VS, GOK, Bangalore

While livestock population has increased, grazing lands such as cultivable and uncultivable wastelands and pastures (excluding forests) have declined by 6 per cent during 1991-92 to 1999-2000. Even the area under forests does not support the increasing demand of fodder by the increasing number of ruminant livestock due to its own degradation. The quality of ruminants in terms of productivity, as also the carrying capacity of grazing lands is fast declining in many areas of the State. The unregulated and continued pressure of grazing on uncultivated lands has led to their further degradation and hence one of the major causes of ecological imbalance.

5.4 Feed and Fodder

Fodder development on livestock farms and on agricultural lands is being one of the major activities of the department of animal husbandry and veterinary services. Fodder development banks have also been set up at livestock farms. Fodder production target of the State for 2002-03 is 7562 tones. Generally, livestock to a large extent have to fend themselves, except in the case of bullocks and lactating animals, which are supplemented and stall-fed with good quality feeds and fodder. It has been estimated that agricultural residues provide around 40 per cent, grazing 31 per cent, green fodder (cut and cultivated) 26 per cent and grain and concentrates

around 3 per cent of total consumption by livestock (SDC, 1995). By and large the nutritional constraints in dairy production are real and the condition under which stall-feeding through concentrate feeding and cultivated fodder becomes viable options are still not clear.

VI. Status of Infrastructure Facility in Agriculture

Availability of infrastructure and its quality are among the major variables causing upward shift in the production surface. Infrastructure development in agriculture has not been quite satisfactory over the last two decades It is an indisputable fact that infrastructure with public investment provokes development and private capital formation. It helps to shift the production surface; at times even without explicitly participating in the production process. We are reviewing here Agricultural Education, Research, Marketing, Mechanization and Credit sectors. Irrigation and other input sectors have been included in the earlier section on resources.

6.1 Agri Education

The triad system of education, research and extension is the key to catalyse and sustain development of agriculture and achieve farming prosperity. Impediments in the agricultural university system are spread around various issues that include: adoption of a rational personnel policy; manpower assessment; inbreeding in faculty development; growth- vis-à-vis student admissions, inflow of research; projects, extension outputs, assignment on consultancy, availability of infrastructure; deterioraty financial health due to block grants from the Government of Karnataka including the externally funded projects, and the thinly spread resources. All these together have been the standing constraints but despite these the agricultural education and research system have contributed meritoriously to the growth of the sector in Karnataka. The two Agricultural Universities in the State helped to create and nurture novel streams of training manpower to meet the demands of serving a rapidly developing agriculture sector and has acquitted itself in many fields within as well as outside the State

6.2 Research and Extension

Research and extension being 'interactive' but, independent departments in the agricultural universities has probably outlived the original intent and purpose. At an operational level, research and extension should reflect convergence and synergy. In the Post- Green Revolution Technology environment, there have occurred significant paradigm shifts in the nature of demand for technology and extension services owing to the second-generation problems. A strategy of 'contract research and extension' consultancy can satisfy the market-driven demands through letting commercial considerations of technology inputs outside the public research extension system, while sparing the needs of small farmers, especially farming in dry land ecosystem, to be met by the "public good" focus of the agricultural universities and the line departments. Prioritization and reprioritization of focus areas in research should be part of a continuous process.

6.3 Farm Mechanisation

Mechanisation in agricultural sector of Karnataka could not record significant spread as it confronts several challenges. These include small and scattered land holdings, low investment capacity of majority of farmers, low farm power availability, non-availability of good quality improved equipment and machinery in the vicinity of farmers, large areas under rain-fed farming, farm equipment reserved for small scale industry, difficulties in mechanization of commercial and horticultural crops and also dry land agriculture and hill agriculture, weak field extension machinery etc. The present level of investment in agricultural machinery is of the order of about Rs.50 thousand crores annually consisting of about Rs.30 thousand crores for tractors, power tillers, combines, pump-sets and other crop production machinery and Rs.20 thousand crores for post harvest and processing machinery.

Agricultural electronics is an emerging new field in the application of science and Technology in agricultural Sector. Karnataka is one of the leading users and innovators in the field The changes in the use of agricultural implements in Karnataka

indicates a decline in the use of indigenous implements during the period 1997 and 2003, which suggests a slow replacement of modern instruments. The usage of the seed-cum-fertilizer drill and other tractor and power-operated machinery is on the rise whereas a negative growth in the usage of a few implements like combines and power tillers can be attributed mainly to the difficulties in owning high cost specialized machines and hence going for custom hiring. Karnataka hardly owns 200 of the farm machinery industry, out of more than 16,000 in India, and most of them are concentrated in Bangalore.

6.4 Status of Agricultural Markets

Currently there are 141 main markets and 342 sub-markets functioning in the State **(Table.15)** and the Department of Agricultural Marketing controls these markets by enforcing the various Acts, like Karnataka Agricultural Produce Marketing (Regulation) Act, 1966 and Rules 1968. The implementation of these however, has not been effective in reducing the market imperfections even though the components of Act promise a perfect marketing situation.

Table.15. Agricultural Marketing Activities in Karnataka

Year	Main Markets (Nos)	Sub Markets (Nos)	Total Markets (Nos)	Total Markets per lakh ha. of GSA	As % of Main Markets in India	Annual Turnover Value for Total Markets (Rs.in Crores)
1990-91	116	295	411	3.392	1.747	2448.05
1991-92	116	303	419	3.563	1.722	3194.33
1992-93	120	304	424	3.421	1.772	3162.72
1993-94	122	307	429	3.497	1.792	3636.89
1994-95	124	320	444	3.504	1.814	4167.48
1995-96	128	324	452	3.665	1.88	4974.5
1996-97	133	329	462	3.745	1.937	5595.09
1997-98	137	332	469	4.01	NA	5554.37
1998-99	140	333	473	3.84	NA	6500.21
1999-00	140	333	473	3.915	NA	6647.81
2000-01	141	342	483	NA	NA	7512.21
2001-02	141	342	483	NA	NA	7902.39

Note: N A – Gross Sown Area is not available for the respective years.

Sources: 1. Statistical Abstract of Karnataka for Various Years. Directorate of Economics and Statistics, Bangalore: Government of Karnataka.
2. Agriculture Produce Marketing Board. Bangalore: Government of Karnataka
3. Fertilizer Association of India. 1997.

Despite these, the marketing institutions and the infrastructure have effected more improvement in the agricultural marketing. At the same time among the main problems of marketing sector inadequacy of market infrastructure has been the main reason for market imperfection. There has been significant increase in horizontal and vertical integration of agricultural markets and that larger share of the marketable surplus reaches market. However, lot remains to be done in creating adequate marketing infrastructure in rural areas.

6.5 Institutional Credit

Institutional credit has played a significant role in enhancing the growth rates in agricultural sector during and after the phase of green revolution. But the changes of pace and pattern of the contribution of agricultural credit emerge as a significant issue. Almost all the districts in Karnataka have experienced a shrinking flow of credit to agricultural sector during the decade of nineties. The supply of agricultural credit as a proportion to net bank credit has been declining in Karnataka. Possibly that explains the emergence of informal moneylenders during this decade

Growth rates in total credit and agricultural credit for the entire period of 1981-2000 as well as two sub-periods, viz., 1981-91 and 1992-2000 in 19 districts of Karnataka **(Table.16)** indicate that the total credit for the whole of the State grew at the rate of 15.6 per cent per annum during 1981-2000. There is no specific pattern, but still one clear observation emerges out of the table that almost all the districts have experienced a reduced flow of credit to agricultural sector during the decade of nineties. The total credit flow has increased marginally. The pattern is almost similar in developed as well as backward districts of the State. It was noted that ACBC in the State was 24.5 per cent during the period 1986-90 and declined to 16.9 per cent by 1996-2000. This suggests that the supply of agricultural credit as a proportion to net bank credit has been declining in Karnataka. Still, the banks have achieved the fixed target in all districts except a few, that points out to the process of fixing lower targets.

Table.16. District-wise Growth Rates of Outstanding Credit by SCBs (Per cent per Annum)

Districts	1981-91		1992-2000		1981-2000	
	Agriculture	Total	Agriculture	Total	Agriculture	Total
Highly developed						
Dakshina Kannada	15.1	15.9	9.1	13.7	8.4	11.9
Mysore	14.2	16.0	11.3	15.4	9.8	13.4
Mandya	21.9	16.7	10.2	12.1	14.3	13.4
Shimoga	23.9	17.6	7.3	9.6	13.9	11.9
Belgaum	15.2	15.8	12.9	13.7	11.9	13.0
Group Total	**16.8**	**16.2**	**10.7**	**13.6**	**11.2**	**12.5**
Developed						
Bellary	17.2	17.3	11.3	14.0	10.9	13.8
Bangalore	20.9	17.1	12.6	19.7	15.6	17.7
Kolar	17.6	15.3	8.0	13.7	12.7	13.7
Chikmagalur	11.3	13.9	23.7	24.3	14.1	15.7
Kodagu	13.0	15.1	20.5	21.8	12.2	13.7
Group Total	**16.9**	**16.8**	**15.5**	**19.7**	**13.8**	**17.2**
Backward						
Tumkur	21.4	19.1	11.3	12.8	15.3	14.6
Hassan	15.8	14.8	16.5	18.2	13.8	14.4
Chitradurga	21.6	19.3	16.9	15.9	16.3	15.5
Uttar Kannada	14.9	14.3	12.4	15.3	9.4	12.7
Dharwad	19.0	16.7	11.1	14.3	11.6	13.9
Group Total	**18.6**	**16.9**	**14.0**	**16.5**	**13.5**	**14.2**
Highly backward						
Raichur	14.3	15.5	13.4	13.7	13.5	13.6
Bijapur	20.2	17.3	16.2	15.4	16.7	16.8
Gulbarga	17.0	22.3	15.1	14.2	14.7	17.3
Bidar	18.5	21.2	11.3	13.9	14.6	17.4
Group Total	**17.1**	**18.2**	**15.3**	**15.5**	**14.9**	**15.7**
All	**17.2**	**16.7**	**12.2**	**16.9**	**13.2**	**15.6**

Source: Reserve Bank of India (various issues of Banking Statistics from 1981 to 2000)

As regard the credit per hectare of gross cropped area across different categories of districts, it was observed that the district/group of districts where banks achieved the higher ACBC, the supply of credit per hectare of gross cropped area was less. For instance, although ACBC was only 10 per cent in developed category of districts, the credit per hectare of gross cropped area was Rs.7, 706 for the period 1996-2000. Similarly, the ACBC were 31.5 per cent and 44.2 per cent in backward and highly backward categories of districts, but the credit availability per hectare of

gross cropped area were Rs.1, 665 and Rs.2, 408 respectively during the period 1996-2000. An increase in the amount of credit per loan account was associated with a decline in the number of farmers having access to the formal credit. This implies that the bankers have been adopting both price and non-price credit rationing strategies while selecting the agricultural borrowers and fixing the credit limit.

VII. Status of Watershed Development

Karnataka State has the highest proportion (79.87 per cent of geographical area) of drought prone area among all major States in the country and in absolute terms Karnataka second largest area (152.16 lakh ha) under drought zone, which is next to Rajasthan (218.95 lakh ha). The rain-fed area contributes around 62 per cent of the agricultural production in the State. Bulk of pulses and oilseeds are grown under rain-fed conditions. Sizable proportion of drought-prone area in the State not only impinges on the growth performance of the State but also perpetuates regional inequality. the Ministry of Rural Development were also initiated several programme since 1980s. Out off 47 watersheds models, Karnataka has 4 models with help of World Bank assistant.

Karnataka has adopted various types of watershed development programmes financed by Government as well as Private Organisations. The total amount spent on watershed development programmes in the State accounts for roughly Rs. 775.89 crores up to the end of March 2003. Even then out of the total geographical area around 190.5 lakh hectares, 116.9 lakh hectares and an additional 12.8 lakh hectares of forestland require watershed treatment and maintenance. The average amount spent per hectare on watershed development amounts to Rs. 3342, Rs. 3024 and Rs. 2320 per hectare in the case of category I (less than 20 ha), II (between 20 to 30), III (more than 30) districts, respectively. Nearly 87.80 lakh hectares of land is yet to be treated under watershed development programme. The remaining area of 65.88 lakh ha not covered under any development programme would require Rs. 3952.38 crores for treatment. Karnataka State is presently implementing 3681 micro watersheds under different schemes. The Department of Watershed Development, Government of

Karnataka has already planned to develop about 21.92 lakh hectares of untreated land by spending an amount of Rs. 1250.47 crores under different ongoing schemes in the next 5 – 6 years.

IX. Challenges to be Confronted during Reforms

Agricultural sector in Karnataka is strongly categorised by the phases of growth and stagnation. Unfortunately, the stagnation phases are longer than the short spans of growth. Despite this the State has successfully maintaining aggregate growth in agricultural sector in a neighborhood of 2 to 3 per cent per annum. This growth potential remains under-exploited due to following major constraints.

- High proportion of rain fed agriculture and domination of low-density low value crops forces into low productivity crops, meager value addition in crop enterprises with little scope for diversification and restricted availability of resources.
- Threatened stagnation in agri growth. Possibility of decelerating growth. Sub-sectoral components providing significant growth initiative and value addition are not growing at the desired rate of growth.
- The un-Irrigated plateau zone of Northern Karnataka and that of southern Karnataka are the main lagging regions of the State and these must participate in the mainstream growth.
- Failure to make investments or initiate investment (especially for private sources) in the rural areas of these two regions has caused impediments to aggregate growth.
- Increasing of small size holding of land due to lack of marginalisation on land. Fragmentation of land leads to increase of cost of production and decrease the quantity and quality.
- Expanded food needs to be met primarily from increases in yields per hectare and the variability in rainfall makes the situation worse in terms of droughts. .
- Move the green revolution into the ecologies, systems and population segments that have not been benefited significantly.

- Food production efforts be associated with those declining environmental quality. Food production efforts with those enhancing environmental quality.
- The Sericulture sector is facing declining capital formation and lack of modernization.
- Investment as a percent of agriculture GDP, and growth of real investment in these areas are low. This should be a concern of public policy, while allocating resources for both agricultural research and extension.
- Lack of facilitating private investment in the backward areas of the State.
- Regional disparities in investment, Technology adoption and Growth
- Malpractices by traders and commission agents in Regulated Markets and addressing the problems of inadequacies and here exploited bye illiterate farmers.
- The availability of funds to initiate agricultural and rural development schemes in the fragile regions with significant value addition.
- Conflicting growth vs environmental options and Inadequate Safety nets.
- Participation of people in the process of liberalisation by enabling a proper conduit towards the most deserving regions and groups of farmers.

X. Policy Suggestions

- The future vision would require concerted efforts towards removing the regional imbalances in growth by promoting private as well as public initiatives in value addition focussed on the post-harvest sector and picking up growth leads from the allied agricultural sector to participate pro-actively in domestic and world trade.
- Capital formation in the agricultural sector must grow at least at the rate of more than 5 per cent per annum to supplement the aggregate growth of the sector. This is feasible by inducing private capital formation through public sector initiatives.
- Emerging regional disparities should be high on the agenda and all efforts should be made to seek participation of the lagging regions in the mainstream growth. This would required additional investment in the lagging regions in

terms of infrastructure, production and processing institutions. Future infrastructural investments therefore, have to be carefully directed towards these regions.

- Irrigation sector has been absorbing a large share of the funds from the State treasury. It is necessary that irrigation sector becomes self-sufficient and in terms of its returns to investment there is necessity that the sector contributes to the aggregate revenue efforts. The additional revenue gained should be used for the development of rainfed agriculture.
- Rainfed agriculture both in terms of technology as well as Research and Development needs to be taken on priority. It would be worthwhile to chalk out a time bound programme to boost the growth in rainfed regions of the State. Any such attempt would require a separate study however, the present Watershed development schemes if implemented under one single umbrella and focussed on a few weak regions would add to achieving this goal. At the same time involve the Larger Section of the Community (NGOs, Panjayat Raj Institutions etc), in the watershed development. Livestock activities provide a good support mechanism. sheep and goat rearing on cooperative basis can be explored as one of the best drought proofing mechanism.
- Next phase of land reforms should provide flexibility as well as free operations in the land market without tampering with the Land Ceiling Act. This should make land economically productive in terms of its distribution and uses. The unabated conversion of agricultural land to non-agricultural uses has to be checked.
- In the input sector, availability of major inputs like seeds, fertilizer and extension of major programmes like IPM, INM, post-harvest processing needs to be located specifically in the regions, which are lagging behind. Investment required for this can be made available through public resources so that incentives are created for attracting private investment subsequently. Post harvest processing should receive high priority in the investment portfolio.
- Reforms in agricultural marketing are long due and after the submission of Guru Committee and Patil Committee reports, we are yet to take action on the

points indicated by these two Committees. It is necessary that marketing infrastructure should be made conducive to face the challenges of globalization and participation in the international trade.

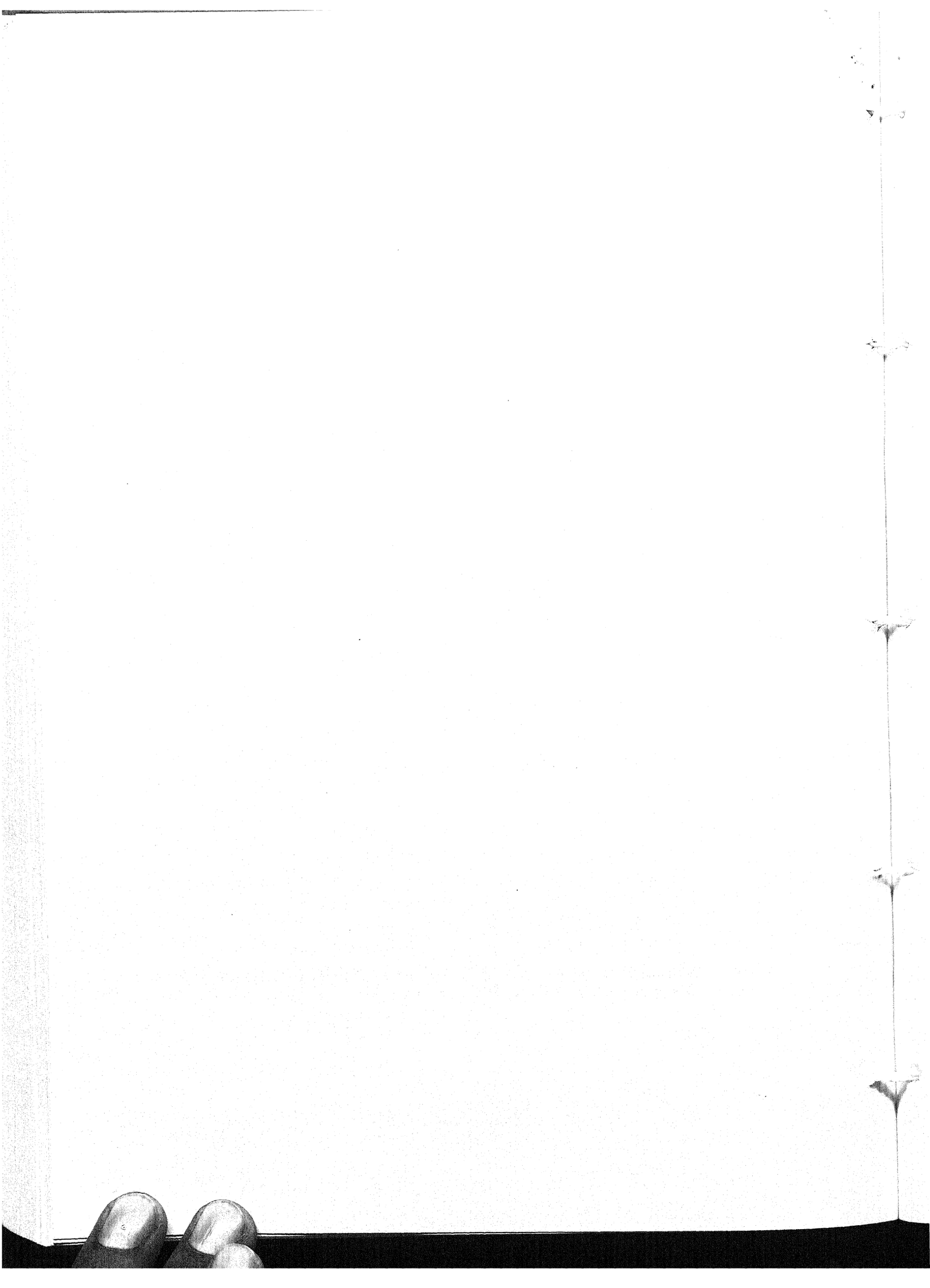
- Credit to agricultural sector has been quite depressing and unless the credit flow to the sector increases substantially from the institutionalised credit suppliers it will be difficult for the sector to achieve a higher-level capital formation and thereby influence the aggregate production structure.
- Investment in Research and Development and Extension, both from public as well as private sources have to be undertaken to supplement the present efforts. *Raitha Samparka Kendras* and *Krishi Vigyan Kendras* can be better conduits for this purpose.
- Horticulture, floriculture, sericulture and fisheries are the emerging vanguards in the trade sectors. It will be essential that the State undertake policies to incentives to the producers and traders in these growth drivers to participate pro-actively in international trade along with post harvest processing.
- To make a critical assessment of the present system and institute reforms to make the system responsive to address changing needs.
- Incidentally, there was virtual absence of any private investment in this sector. It is high time now that the investment in this sector also comes from private sources. Conducive environment for attracting private investment would be required.
- Provision of information to farmers about the benefits of sale in regulated markets, streamlining of pledge loan scheme, and amalgamation of regulated markets. Group marketing by farmers, farmers markets and strengthening of rural periodic markets, agricultural marketing extension (KSAPC, Report No. 10, March 2004) and incentive for private sector to participate in market developments.
- Creating a market access for domestic products vis-à-vis imported agricultural commodities and Creation of market incentives for the farm produce that require special treatment due to vulnerability to international price fluctuations.

- Market intervention system either to private agencies or by the State agencies. PRIs, NGOs and self-help groups be effectively involved in improving awareness about post-harvest handling methods and creation and maintenance of infrastructure at primary market level. A selective MIS needs to be put in place for commodities, which are not covered by the minimum price support programme.
- The significant share of utilizable but wasted land resources need to be brought under economic cultivation and the process of urbanization has to be carefully monitored.

References

- Alagh, Y. K, (1999). "Agricultural Policy In The Ninth Plan". Hans. E. Karl andB. J. Nanjundappa. Memorial Lecture, IAT, Bangalore.
- Bhalla,G.S. and Gurmail Singh(2001). "Indian agriculture-For Decades of Development", New Delhi, Sage
- Bhende, M. J, (2000). " Cropping patter and Resource use Efficiency in Major crops: A Case Study of Karnataka". ADRT Unit, Institute for Social and Economic Change, Bangalore.
- Bisaliah, S and K. Krishnegowda, (2001). "Creating Appropriate Development Environment for Small Farmers". U. A. S, Bangalore (Mimeo).
- Bisaliah, S, (2004). "Sectoral report on Economics, Extension and Management", Prepared for the Committee, constituted by parliamentary Standing Committer on Agriculture, Government of India. (Mimeo).
- Bisaliah, S, (1997-98). "Monitoring and Evaluation of Agricultural Research System". J of IAUA, Vol. 9-10. No. 1-2, 1997-98.
- Bisalaiah, S, (2004). "Production and Marketing of Organic Farm Products: International Perspectives and Lessons for Karnataka". (Mimeo).
- Chengappa, P. G, et al, "Economic Viability of Small Farmers in Karnataka: A Reconnaissance Study", U.A.S, Bangalore, 1996.
- Deshpande, R.S. and K.V. Raju (2001). "Rural Policy for Growth and Poverty Reduction ", Agriculture Development And Rural Transformation Unit, Institute for Social and Economic Change, Bangalore
- Deshpande, R. S., Bhende M.J., Thippaiah P. and M. Vivekananda (2004). "State of the Indian Farmer: A Millennium Study Vol.9, Crops and Cultivation", New Delhi, Academic Foundation and Ministry of Agriculture, Government of India
- Deshpande R.S. and J. Prachitha (2004). "Building up of an Efficient Marketing System to Obviate the Need for Large Scale State Intervention in Karnataka", Research Report Agriculture Development and Rural Transformation Unit, Institute for Social and Economic Change, Bangalore
- Deshpande, R. S. and D. V. Gopalappa, (2004) "Economic Poverty and Inequalities", in John, D and Paulson, V. V., KRCR- JPC Publications, Bangalore.
- Deshpande, R. S. and Nikumbh, S. R, (1993)."Treatment of Uncultivated Land Under Watershed Development Approach", Artha Vijnana, Vol XXXV, No.1 March.

- Deshpande,R. S. and A. Narayanamurthy, (1999). "An Appraisal of Watershed Development Programme Across Regions in India" Artha Vijnana, Vol. XLI, No. 4, December.
- Deshpande,R. S and Thimmaiah, G, (1999)."Watershed Development Approach and Experience of National Watershed Development Programme in the Country". Journal of Rural Development. Vol. 18 No. 3.
- Deshpande,R. S and T. Raveendra Naika, (2002). "Impact of Minimum Support Prices on Agricultural Economy": A Study in Karnataka. ISEC, Bangalore.
- Deshpande, R.S. , Bhende M J and S. Erappa (2003). "Output and Impact Monitoring Study of KAWAD Project", Research Report, Agriculture Development and Rural Transformation Unit, Institute for Social and Economic Change, Bangalore
- Karnataka State Agriculture Price Commission (KSAPC), (2003)."Marketing Behaviour of Farmers in Karnataka" Report No. 8. July.
- Karnataka Agriculture Commission (KAC),(2001). "Yield Improvement Mission", Government of Karnataka, Bangalore.
- Karnataka State Agriculture Price Commission (KSAPC), "Procurement, Storage and Disposal of Agricultural and Horticultural Commodities" Report No. 7, 2003.
- Government of Karnataka (2001). "Report by the Cell on WTO and Related Issues in Agriculture and Food", Department of Agriculture and Horticulture, Bangalore.
- Government of Karnataka (2003). "Report of the Committee on Regional Imbalances" (Chairman :D.M. Nanjundappa)
- Govt of Karnataka (2004). Karnataka State Policy on Organic Farming. Government of Karnataka. Bangalore.
- Karnataka State Agriculture Price Commission (KSAPC), (2004). "A Study on the Performance of Regulated Markets in Karnataka". Report No. 10, Govt of Karnataka, Bangalore.
- Pal Suresh and Alka, Singh, "Agricultural Research and Extension in India: Institutional Structure and Investments". NCAP, New Delhi, 1997.
- Ramaswamy, C, (2004). "Constraints to Growth in Indian Agriculture: Needed Technology, Resource Management and Trade Strategies". IJAE, Vol.59 No.1., January-March.
- Rao, V. M.(2004). "State of Indian Farmer: A Millennium Study, Vol 10, Rainfed Agriculture, Academic Foundation and Ministry of Agriculture, Government of India, New Delhi.



AGRICULURAL DEVELOPMENT IN BIHAR : PERFORMANCE, CONSTRAINTS AND STRATEGIES

By

ALAKH N. SHARMA
ANAJANI KUMAR

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

Preliminary Draft

AGRICULTURAL DEVELOPMENT IN BIHAR: PERFORMANCE, CONSTRAINTS AND STRATEGIES

by

Alakh N. Sharma and Anjani Kumar

1. INTRODUCTION

Bihar, the third most populous state and urbanization level of only 10.5 per cent, has the highest rural population density among major states of India. With low level of non-farm sources of income, it has resulted into a very high dominance of agriculture in Bihar's economy which is well reflected in terms of its population dependent on agriculture as well as share in the state GDP. These numbers for Bihar are significantly higher than the national average and almost all other states in the country. The natural resource endowments of the state are dominated by land and water—the basic resources for agriculture. The state is devoid of minerals or other deposits; forests have a nominal presence. But the population pressure on natural resources is exceedingly high. Human as well as livestock population place a very heavy burden on agricultural resources. Further, the rate of transformation of Bihar's economy in terms of growing importance of non-farm and non-agricultural sector is much slower. The opportunities for diversification of production activities are largely confined to agriculture. But the trends in Bihar's Gross State Domestic Product (GSDP) data indicate that the growth performance has been quite weak, both in erstwhile Bihar and post-bifurcation-period. The highly adverse demographic scenario and low rates of growth have led to the very low level of per capita income which stands among the lowest in the country. In 1993-94 per capita income of Bihar was Rs. 3034 vis-à-vis Rs. 7690 at all India level, which means about 40 per cent of the average for the country. By 2002-03 this gap had widened further with Bihar's per capita being only about 31 per cent of the all-India average. The state has the highest percentage of population below poverty line, next only to Orissa. The state has also a very low degree of industrialization and accompanying urbanization with the result that much of the load of population and the poor has to be borne by the rural segment which account for nearly 90 per cent of the total population of the state as also roughly the same population of those falling below the poverty line. On the other side of the picture, Bihar has one of the best alluvial soils in the country with substantial irrigation potential based on the mighty Ganges and its tributaries, although in their present state, floods are a serious and recurrent problem. But these characteristics do provide Bihar with a very rich agricultural base although

this potential is far from being fully tapped. This has apparently been one of the factors which has contributed to Bihar achieving 13.67 percentage points reduction in the incidence of rural poverty during 1994-2000. Yet, despite this silver lining, Bihar continues to be saddled with 425.6 lakh persons below the poverty line, which exceeds that of any other state in the country next only to that of Uttar Pradesh.

It is thus obvious that for alleviating poverty in Bihar, agriculture and related sectors have to play the key role. In this background this paper examines the performance of agriculture sector in the state, highlights the constraints in realizing the optimum potential and points out towards some strategies and policies for its development.

II. STRUCTURE OF BIHAR ECONOMY

Before going into the detailed analyses of the performance of agricultural sector in Bihar, the section examines the sectoral structure of the Bihar economy, and some facets of the growth process which are inextricably interlinked to agricultural development.

Table 1 presents the percentage composition of Gross State Domestic Product (GSDP) of Bihar and GDP of India as a whole at two points of time, namely in 1993-94 and 2003-04. The current share of the Primary Sector (37.40 per cent) is roughly one and a half times that of the All-India level (24.03 per cent). While this is a manifestation of a typical less developed state economy, it also arises from some of the areas of comparative advantage in non-crop segments within the Primary Sector which Bihar possesses. This is evident from the proportionately higher contribution of Forestry (1.50 per cent) in Bihar vis-à-vis All India (1.03 per cent), and Fishing (Bihar=1.66 per cent, All-India =0.96 per cent). Even agriculture which contributes 33.9 per cent in Bihar as against 19.96 per cent at All India level, hides the fact the in the absence of separate break-up of agriculture into crop sector and allied activities which are clubbed together in SDP classification into a single category, a substantial portion of this 33.9 per cent is based on contribution of Dairying, Vegetable Cultivation and Horticulture. Fishing also provides the sources of livelihood to a large number of people hovering around the poverty line. These are some of the activities in which Bihar has a distinct comparative advantage arising out of its rich alluvial soil and hydro resources, although the latter have got to be properly harnessed before they can be fully utilised.

Table 1

Structural Composition of Income (GSDP) of Bihar and India (1993-94 and 2003-04)

Industry	Bihar			India		
	1993-94	2003-04	Point Change	1993-94	2003-04	Point Change
Agriculture	45.27	33.15	-12.12	28.39	19.73	-8.66
Forestry & Logging	1.94	1.73	-0.21	1.47	1.02	-0.45
Fishing	1.43	2.12	0.69	1.11	0.95	-0.16
Mining &Quarrying	0.15	0.39	0.24	2.57	2.33	-0.24
SUB TOTAL(Primary)	**48.78**	**37.40**	**-11.38**	**33.54**	**24.03**	**-9.51**
Manufacturing	5.31	4.53	-0.78	16.06	16.98	0.92
Registered	2.53	1.92	-0.61	10.48	11.20	0.72
Un-Registered	2.78	2.62	-0.16	5.58	5.77	0.19
Construction	3.38	5.23	1.85	5.20	5.18	-0.02
Electricity, Water Supply &Gas	1.23	1.44	0.21	2.43	2.38	-0.05
SUB TOTAL(Secondary)	**9.93**	**11.20**	**1.27**	**23.69**	**24.54**	**0.85**
Transport, Storage &Communication	4.77	6.00	1.23	6.54	9.58	3.04
Railways	2.63	2.40	-0.23	1.23	1.20	-0.03
Transport by Other means &Storage	1.48	1.46	-0.02	4.10	4.65	0.55
Communication	0.66	2.14	1.48	1.21	3.74	2.53
Trade, Hotel & Restaurants	14.67	15.56	0.89	12.72	15.97	3.25
Finance&Real Estate	6.11	7.80	1.69	11.53	12.84	1.31
Banking &Insurance	2.53	3.92	1.39	5.33	6.82	1.49
Real Estate,Ownership of Dwelling&Business	3.58	3.88	0.30	6.20	6.02	-0.18
Community and Social Services		22.05	22.05		13.03	13.03
Public Administration	7.64	7.75	0.11	5.58	5.65	0.07
Other Services	8.10	14.30	6.20	6.40	7.39	0.99
SUB TOTAL-Tertiary	**41.29**	**51.40**	**10.11**	**42.77**	**51.43**	**8.66**
TOTAL GSDP	**100.00**	**100.00**		**100.00**	**100.00**	

The contribution of secondary sector to SDP in Bihar (11.20 per cent) is roughly only about half of that at the All-India level (24.54 per cent). Main contribution is from the tertiary sector (51.40 per cent) which is roughly of the same order (51.43 per cent) as at the All-India level. The high contribution of tertiary sector is presumably based to a considerable extent on its informal component. This is also reflected in the fact that the 'Community and Social Services' component within the tertiary sector contributes a much larger share (22.05 per cent) than at the All- India level (13.03 per cent). This segment offers scope for considerable informal employment, which often verges on disguised unemployment and shelters poverty.

Over the period 1993-94 to 2003-04 as well shift towards the tertiary sector (+8.66) was the maximum, secondary sector having gained only by 0.85 percentage points. Within the Primary

Sector, in keeping with the general pattern, all the sub-sectors showed a shrinkage but fishing did gain in ground having registered a positive shift. This reflects the potential of this activity within Bihar.

Thus there is some evidence of structural diversification towards non-agricultural activity within the primary sector and towards the tertiary sector, which is good from the point of view of its impact on the incidence of poverty. But there has been hardly any shift towards the secondary sector.

III. AGRICULTURAL PERFORMANCE

1. Sub-sectoral Growth in Agriculture

The estimates of growth of aggregate output in crop, livestock and fishery sectors based on incomes are presented in Table 2. Agriculture, which accounts for more than 60 percent of land resources and currently shares for about 33 % of GDP, has been growing moderately. However, the erstwhile Bihar had a rate of agricultural productivity 20 percent higher than the national average during the early 1980s. Now it has agricultural productivity about 7 percent lower than the national average (Chand, 2001). Fisheries, livestock and forestry sector has registered significant positive growth. Particularly, the growth in fisheries output has been noteworthy. It grew at the rate of nearly 8 percent per annum. The livestock GDP has observed an annual growth rate of about 5 percent per annum. These aggregate numbers enthuse confidence about future growth of the agriculture sector in the state. However, in view of the dilapidated status of statistical system in the State, these figures have to be read carefully as there has been shown sudden jump in these figures in recent years which seems to be contrary to the ground realities prevailing in the state. It is also important to note that there has been phenomenally very high magnitude of fluctuations in the annual growth rates of agriculture where it has alternated between a positive and a negative growth rate, ranging from + 36% p.a. to –24.73% p.a. under these circumstances, even when trend growth rate figures for decade as a whole are high, for those engaged in segments which experience a frequent drop in annual growth rate figures to the negative range, the prospects of sudden slippage into the poverty trap can indeed be daunting.

Table 2
Sub-sectoral Growth in Agriculture sector in Bihar
(1993-94 to 2004-05)

Item	CARG (%)
Ag GDP (Crop + livestock)	2.91
Fisheries GDP	7.96*
Forestry GDP	3.23*
GDP	5.04*
GDP/capita	2.50

Source: Base data are from Directorate of Statistics and Evaluation, Government of Bihar
**Significant at 1%*

2. Cropping Pattern

More than 61 percent of land resources of the state are locked into crop production. Foodgrain crops account for 87 percent of the gross cropped area (GCA) in the state. Subsistence concerns obviously dominate farmers in Bihar. At the country level, only about 65 percent area is occupied by foodgrain crops. Rice is the dominant crop of the kharif season and it occupies 44 percent of the cropped area. In fact, rice and wheat together claim nearly 70 percent of the cropped area and the share of wheat in GCA of the state has increased significantly from 20 percent in the early 1980s to 25 percent at present (Table 3). The seven cereals (rice, wheat, maize, barley, ragi, jowar and bajra) occupy around 78 percent and leave very little area for pulses, the other group of foodgrain crops. Oilseeds have a minor presence and non-food crops (sugarcane, potato, tobacco, jute), which generate much higher value of output per hectare, are grown only on 9 percent of the area. These data and their comparison with national figures suggest that small farm size and high subsistence pressure has forced low-value subsistence crops grown in Bihar even though these have high production potential. Further, trends in cropping pattern also reveal a persistent rigidity over time and continued dominance of subsistence crops. However, whatever diversification towards high value crops exists, this did not show much scale biasness. For instance, marginal and large farms allocated a relatively higher proportion of land to the vegetable and fruit cultivation (Table 4). But the negative relationship between cropping intensity and land size was clearly visible at both national level as well as in Bihar. In the state of Bihar this is more distinct. The higher dependence of small farms on agriculture encourages as well as compels the farmers to use land more intensively.

Table 3

Cropping Pattern in Bihar

Crop/crop groups	TE 1981	TE 2003
Rice	45.11	44.37
Wheat	19.85	24.82
Maize	8.35	7.51
Coarse cereals	11.16	8.40
Total cereals	*76.13*	*77.59*
Pulses	12.92	9.09
Total food-grains	*89.05*	*86.68*
Oilseeds	1.94	2.10
Fibers	2.37	2.05
Sugarcane	1.38	1.28
Tobacco	0.20	0.23
Fruits and vegetables	4.34	7.51
Spices and condiments	0.33	0.16
Source: Directorate of Statistics and Evaluation, Government of Bihar		

3. Crop Productivity in Bihar

The reason for the dominance of rice and wheat in the total cropped area becomes clear when we look at the relative productivity of selected crops (Table 5). The productivity of these two crops was almost highest among all the food crops. Moreover, the hike in productivity in these two superior cereals was also larger than those of coarse cereals as well as pulses. As among cereals, price of these two main cereals was also higher than other coarse cereals, thereby the profitability remained always higher for them leading to dominance of these crops in the cropping pattern. However, comparing Bihar with other agricultural advanced states, it is found that despite relatively favourable soils and climate, yield levels for most crops are low in the state. Table 6 shows the average yields in Bihar compared with the national average and the best performing states. The average productivity of rice and wheat, the dominant crops of the state, is 22 and 26 percent lower than the national average and less than half as compared to the best performing states. The same is true for the important commercial crops like sugarcane and potato. Their productivity levels in Bihar are around 40 percent of those in the best performing states. For maize, pulses, and oilseeds, however, the state yields compare well with the national averages, but specific states have done much better.

Table 4
Cropping Pattern across Different Farm Categories

Land Class	Paddy	Wheat	Other Cereals	Pulses	Food grains	Oil seeds	Sugarcane	Vegetable & fruits	Fodder	Other Cash Crops	Other crops	Total	CI (%)
Bihar													
Marginal	45.0	37.3	6.1	4.9	93.4	0.9	0.6	2.5	0.2	1.4	1.0	100	174.1
Small	44.8	35.7	5.4	6.8	92.7	1.3	0.9	1.5	0.2	1.1	2.2	100	170.1
Medium	45.6	34.6	5.6	7.0	92.8	1.8	1.2	1.5	0.2	1.2	1.4	100	171.5
Large	42.2	34.8	3.9	9.7	90.6	3.5	1.1	2.1	0.3	1.1	1.3	100	153.4
Total	44.5	35.8	5.4	6.9	92.5	1.7	0.9	1.9	0.2	1.2	1.5	100	168.0
India													
Marginal	40.0	21.9	12.8	5.4	80.1	4.6	1.6	4.7	1.9	3.8	3.3	100	134.6
Small	33.0	20.7	15.1	7.2	75.9	7.2	2.3	3.3	2.3	5.0	4.0	100	129.2
Medium	25.9	20.7	17.0	8.2	71.8	9.7	2.5	2.5	2.4	6.3	4.9	100	126.5
Large	15.8	19.6	19.0	10.3	64.7	12.9	1.9	2.0	2.5	9.7	6.4	100	116.8
Total	27.3	20.6	16.3	8.1	72.2	9.1	2.1	3.0	2.3	6.6	4.8	100	125.4

Source: Computed from unit level data of NSSO 54th Round

Table 5
Productivity of selected agricultural commodities in Bihar
(kilograms per hectare)

	TE 82-83	TE 87-88	TE 92-93	TE 97-98	TE 00-01
Rice	830	1060	987	1384	1384
Wheat	1350	1567	1790	2170	2127
CC (kharif)	877	1121	1215	1249	1408
CC (rabi)	719	757	1740	2492	2465
Pulses (kharif)	603	673	701	705	884
Pulses (rabi)	604	700	775	717	842
Oilseeds (kharif)	395	427	436	599	678
Oilseeds (rabi)	486	588	690	700	798
Sugarcane	33100	35000	48900	44900	44000
Jute & Mesta	982	1285	1343	1555	1202

Source: Agriculture Statistics at a Glance, Dir. of Eco. Statistics

Table 6
Relative productivity for selected agricultural commodities, 1999-00

Crop	Productivity in Bihar (kg/ha)	All India Productivity (kg/ha)	Highest productivity achieved by Indian states
Rice	1540	1990	3346 (Punjab)
Wheat	2061	2755	4696 (Punjab)
Coarse cereals	1816	1034	2675 (Punjab)
Maize	2004	1785	3182 (AP)
Pulses	804	630	965 (UP)
Oilseeds	808	856	1417 (TN)
Sugarcane	41665	70825	105757 (TN)
Potato	9802	18643	23753 (WB)

Source: Agricultural Statistics at a Glance, published by Directorate of Economics and statistics, Ministry of Agriculture, GOI.

More direct evidence on yield gaps and potential is provided in Table 7 which compares state average yields with those obtained in national demonstrations and other trials in the state. The latter indicate achievable yields with existing knowledge. Thus there exists potentiality of crop output being substantially raised in the state.

4. Total Factor Productivity Growth in Bihar Agriculture

A more definitive judgment regarding performance of agricultural sector is provided by total factor productivity and Table 8 presents data on output, input and TFP growth in the three agro-climatic zones over the 1980-97 period[1]. For the state as a whole, crop output grew at 1.8 percent per annum and input and TFP growth rates were 0.8 and 0.9 percent, respectively. These figures are not impressive by any standard. It may be noted that TFP growth, which

[1] These data are taken from an unpublished study "Economic analysis of total factor productivity of irrigated agriculture by district and region" conducted by P. Kumar et al (2002) funded by Indian Council of Agricultural Research under National agricultural Technology Project. We are grateful for the permission to use the information from the draft report.

mainly represents the contribution of technological change, has been an important source of output growth; the south Bihar zone shows the best performance in this regard even though output growth is low. When compared with other studies (Bhalla and Singh 2001; Kalirajan and Shand 1997; Murgai, 1997) for the country one notes substantially lower growth in input use in Bihar districts and this appears to pull down output growth. TFP growth rates are comparable with the estimates obtained in other studies. This clearly shows that even the conventional strategies for agriculture have been neglected in the state, particularly over the last decade.

Table 7
Yield gaps for various crops in Bihar

(kgs/ha)

Crop	State average yield	Potential yield*	Yield gap
Rice	1218	3026	1808
Wheat	1816	3052	1236
Maize	1844	4056	2212
Gram	1017	1380	363
Arhar	1379	1830	451
Rape-Mustard	1360	1850	490
Jute	1409	2010	601
Sugarcane	48856	62780	13924
Potato	9060	23500	14440
Onion	8510	15360	6850
Tobacco	1260	3680	1220
Bhindi	1200	1860	660
Cauliflower	1500	1880	380
Brinjal	1250	1860	610
Chillies	1060	1830	770
Cucumber	1250	1850	600
Bitter gourd	1200	1850	650
Sponge gourd	1000	1760	760
Ridge gourd	1200	1860	660
Cabbage	1250	1850	600
Pineapple	1600	3200	1600
Tomato	1255	1868	613
Mango*	1000	1660	660
Litchi*	1000	1850	850
Guava*	1000	1450	450
Citrus*	1000	1500	500
Banana*	5000	8000	3000
Papaya*	3000	5000	2000

Source: Yadav et al (2000)
Note: * Yield achieved in National Demonstration and other demonstrations

Table 8
Annual growth (%) in input, output and TFP indices in crop sector in Bihar

Agro-climatic zones	Input	Output	TFP	% Share of TFP in output growth
Zone I (North – West)	1.00	1.87	0.87	46.29
Zone II(North – East)	1.05	2.01	0.96	47.68
Zone III (South)	0.34	1.38	1.04	75.40
Bihar	0.83	1.77	0.94	53.11

Source: Kumar et al (2002)

Table 9 gives the distribution of cropped area in the state in terms of TFP growth in the two decades. In north-west and south Bihar zones, there has been some increase in the area recording high TFP growth. In all the three zones there has been an increase in the area recording negative TFP growth in the nineties. Research and extension, education, and infrastructure are the major determinants of TFP growth and greater attention to these investments will be essential in the future to ensure sustainable agricultural production.

Table 9
Distribution of cropped area according to TFP growth in Bihar-Period wise (Percent share of GCA)

Agro-ecoregion	Period	Negative	Stagnant	Low	Moderate	High
Zone I	1980s	-	74.7	7.3	7.1	10.9
	1990s	22.0	35.9	-	11.1	30.9
Zone II	1980s	-	72.3	-	-	27.7
	1990s	57.3	-	42.7	-	-
Zone III	1980s	12.9	38.9	-	30.2	18.0
	1990s	17.9	39.1	-	-	43.1

Source: Kumar et al (2002)

The above TFP trends indicated stagnation in the agriculture sector particularly in crop sector in Bihar. We have further probed the trend with the recent data and in somewhat disaggregated for the crops in Table 10. The trends in area and production of major crops reaffirmed the above findings. The productivity of almost all crops has stagnated in 1990s. Apart from maize all other crops have shown stagnation in productivity and whatever the gain in production has been observed, it is attributed to the area expansion and the role of productivity growth is small. This disturbing trend in productivity is a matter of concern and it may be consequence of neglect of public investment (infrastructure, R&D, extension, etc) in agriculture in Bihar.

Table 10

Annual Compound Growth in Area, Production and Yield of Major crops in Bihar

Crops	1990-2003		1995-2003	
	Area	Production	Area	Production
Rice	0.59	2.87	1.14	0.20
Wheat	1.04	1.37	0.69	-0.74
Maize	1.22	1.09	1.98	1.47
Arhar	0.59	-1.12	1.16	0.23
Gram	-5.00	-4.67	-5.68	-3.12
Lentil		1.58		4.03
Lathyrus		-3.25		-0.30
Sugarcane	-2.54	-2.62	-1.55	-1.34

5. Horticulture Sector

Fruits and vegetables occupy a very important position in the agricultural economy of the state. Together, these contribute more than 30 percent of the gross value of agricultural produce. About 34 lakh tonnes of fruits and 117 lakh tonnes of vegetables are produced annually. Bihar occupies a commanding position in mango; production of different varieties add-up on an average 15 lakh tonnes per annum. In the case of litchi, it is the largest producing state accounting for as high as 75-80 percent of the total output in the country and Muzaffarpur has the distinction of producing the best quality of litchi. It also contributes the maximum acreage under litchi in the state. Banana, guava, jackfruit, papaya are other important fruits. The major items of vegetables produced are potato, cabbage, cauliflower, brinjal, tomato, onion and chillies. All important varieties of vegetables are grown in all the districts.

The growth trends of major fruits and vegetables are presented in Table 11. Major horticultural crops have exhibited mixed growth trends. Brinjal, tomato, cauliflower, onion, litchi and banana recorded a significant growth in area as well as production. The area under mango and potato grew by 3.72 and 1.1 percent per annum, respectively. The production of mango showed a declining trend while the growth in potato production was not significant. Mango covers nearly half of the area under fruits in the state and therefore declining trend in its production mainly because of decline in productivity is a matter of concern. The area under guava did not exhibit significant trend, its production declined substantially (at the rate of 6.91 percent per annum). Chillies, also, did not record significant growth in area or production. Performance of banana was the most remarkable. Area under banana increased by 5.54 percent per annum, its production witnessed a tremendous productivity jump and increased at the rate of 23 percent per annum. Area under jackfruit also grew at more than 5 percent per annum but its production did not exhibit significant growth. These numbers indicate the need to focus attention on market trends. Crops, which appear to be of minor

importance in terms of area offer more growth opportunities. Obsession with major crops and food production has distracted attention from this productivity source.

However, Bihar accounts for a very low share of the processing units. Fruit and Vegetable Processing Industries (FVPI) in the state is very underdeveloped and faces many constraints. Post-harvest technology particularly for fruits and vegetables is still primitive. The huge loss amounting to 25-30 percent of the total fruits and vegetables produced occur annually on account of poor methods of harvesting and transport. Further, fruits and vegetables grown in Bihar are mostly of stable rather than processing variety. There is, therefore, need to upgrade the production technology and the adoption of modern post-harvest technology on a large scale for giving dynamism to this sector.

Livestock is an important source of income and employment for millions of landless and small landholders in the state. Moreover, livestock wealth is more equitably distributed than land. Development of livestock sector is thus reckoned to reduce interpersonal and interregional inequities and alleviate poverty. Even though reorganization of dairy with marketing in the state has paid rich dividends, low output levels and under exploited meat (including poultry) sector has considerable latent potential.

Table 11

Growth trends in major horticultural crops in Bihar (1990-91 to 2003-04)

Crops	Bihar (CARG %)	
	Area	Production
Potato	1.10*	0.49
Brinjal	4.06*	7.16*
Tomato	5.28*	6.19*
Chillies	-1.46	-0.57
Cauliflower	6.93*	4.68*
Onion	2.31*	4.59*
Mango	3.72*	-1.61*
Guava	-0.83	-6.91*
Litchi	6.28*	9.83*
Banana	5.54*	23.04*
Jackfruit	5.12*	2.47

Source: Base data are from Directorate of Statistics and Evaluation, Government of Bihar
*Note: * indicates statistical significance at 5% level*

Milk, eggs, meat and wool are major livestock commodities. About 3.18 million tones of milk, 778 million eggs, 0.15 million tones of meat and 0.6 million kg of wool were produced in the state in 2003-04. The growth performance of livestock sector from 1993-94 to 2003-04 has been presented in Table 12.[2] Among major livestock commodities, only milk and wool

[2] Prior to 1993-94, neither districtwise nor aggregate data for re-organised Bihar were available.

have shown significant growth. However, growth performance recorded by even these two commodities was not appreciable. Good performance of COMPFED has to be interpreted in this light as it suggests diversion of supplies rather than higher production. Major livestock commodities have grown at around 5 percent per annum in the country in recent years (Kumar 2001) and have contributed to accelerated diversification, but Bihar appears to have been left behind. Though Bihar has one of the largest livestock population in India, there is only one meat producing and processing unit in the state. Very little amount of the meat and poultry products is scientifically produced, processed and packaged (http:/bihar.hypermart.net/food.htm). With growing urbanization and quality consciousness, the demand for quality livestock products is developing rapidly in national and international markets. The state should strive hard to tap these opportunities.

Growth trends in fish production have shown tremendous performance. However, in spite of the promising performance of fisheries sector, the marketing infrastructure for fish products is far from satisfactory and one of the weakest in the country. Practically there is no definite structure of fish markets in the state as in the country. The marketing systems developed so far does not cater to the needs of the local fish producers scattered across villages. The entire large scale and wholesale marketing and transport of fish is done by private traders. In late nineties only around 3.5 percent of the total fish produced in north Bihar used to arrive in the regulated markets for sale. Further, other states mainly Andhra Pradesh accounted for about 40 percent of the total fish arrivals in the regulated markets in the state (Singh 2001). A significant area under tanks and ponds is in a derelict and semi-derelict condition. This calls for appropriate intervention and investment to renovate these water bodies. The existing leasing policy favours allotting the water area to fishermen's cooperative societies and not to individuals. In Bihar, most of the societies are not functioning well and are faction-ridden and dominated by a few influential persons (Datta and Chakrabarti, 1999).

Table 12
Growth rates of major livestock products in Bihar (1993-94 to 1999-00)

Items	CARG (%)
Milk	2.98*
Meat	0.32
Eggs	-0.64
Wool	1.93*
Fish	658*

Source: Base data are from Directorate of Statistics and Evaluation, Government of Bihar
**Significant at 5%*

IV. IMPLICATIONS ON DEMAND-SUPPLY GAP

The bifurcation of Bihar has increased the role of agriculture in its economy and it has been assumed that Bihar has comparative advantage in agricultural production and some quarters have argued that the new Bihar is self sufficient in food production and has surplus capacity for export. However, it has not been empirically established. The self-sufficiency and the surplus situation can be judged by the extent to which it meets the food requirements, both in quantitative and qualitative terms i.e. whether the current production meets the different kinds of food that make up a balanced diet for its population? Theoretically, self-sufficiency of a state is not a crucial issue as inter-state movement of foodgrains meet the requirements of deficit states. However, in practice the adequate production at the state level is important because it facilitates consumption particularly in rural areas and the poor at a relatively cheaper rates (Srivastava, 2003). The poor state of agriculture is reflected in the high levels of deficit in the requirements and state production of different products. Apart from vegetables and fruits, state is not even producing enough to meet the actual consumption requirements leave the norms of balanced diet and surplus situation. Even for the main staple crops like rice and wheat state has to depend on other states to meet its requirements. The situation in the case of pulses, edible oils, sugar is even worse. In some cases state is not even able to meet even its 50% of the requirements from its own production. The state is producing a huge surplus of fruits and vegetables and should look for export opportunities for these high value commodities. For other crops and livestock products, state is in dire need of increasing productivity and enhance production to be self sufficient and then can afford of thinking of generating surpluses for export of these items.

V. CONSTRAINTS TO AGRICULTURAL GROWTH

Bihar is well endowed with land resources. The soils are predominantly thick alluvial deposits, or swamp and Terai soils, rich in nutrients like nitrogen, potash and phosphorous. The state also has surplus water with potential to support for double and multiple cropping. Thus the state has abundant natural resources, which if utilized judiciously can propel growth equal to, or even better than the more developed agrarian states of the country. However, against this rather positive scenario, Bihar's agricultural performance has been dismal and far below its potential as has been observed earlier. There have been several constraints for agricultural development in the state. These relate to a variety of factors such as infrastructure, agrarian structure and relations, governance and institutions environmental factors etc.. Some of these constraints are discussed below:

1. Land Resources

A significant area of the state is afflicted by recurrent floods. More than 41 percent area of the state is flood prone. Vagaries of monsoon also cause droughts and crop failures. About 40 percent area of the state is drought prone. Despite more than 50 years of efforts, the problem persists and undermines production, investments, and livelihoods over a large part of the state. Further, water logging affects a substantial area in the state. *Diara, tal, and chaur* lands are kept fallow during kharif. A substantial fraction of paddy area (some estimate it to be about 20 percent) is under deep-water ecology where yields are low and modern varieties or fertilizers do not perform well. Heavy investments will be needed to address these basic constraints relating to land, which limit productivity in substantial portion of the cultivated area.

2. Water Management

Even though the state is well endowed with water resources, due to poor water management problems of drainage, floods and droughts are widespread and frequent and thus often it turns it to a scourge. A well designed and time-bound programme on this is essential. Surface irrigation systems in the state present a gloomy picture. The problems (water allocation, use efficiency, maintenance, cost recovery, distribution, etc.) are well documented (Chandramohan et al 2001; Working group report on irrigation, IXth Five Year Plan, Planning Commission). There is a need to draw upon experiences from other states and design appropriate policies and programmes.

Groundwater exploitation has played a major role in irrigation sector development in the state. However, the average level of ground water exploitation in the state is approximately 39 percent, leaving a huge potential for future development. Groundwater development on a scientific basis must receive the highest priority. Lessons from the past make it very clear that digging state tubewells is not the way to go about it. Some experts have identified pricing and distribution as major sources of inefficiency in irrigation sector. The state will need to take hard decisions considering both efficiency and equity factors. The innovative Paliganj Participatory Irrigation Management is an example of excellence and need to be replicated.

3. Small Farms and Fragmentation of Holdings

Bihar agriculture is predominated by small farms with fragmented land holdings. More than 84 percent of the farmers are having less than one ha of operational holding and the average size of operational holding in the state is only 0.6 ha. Fragmentation of holdings poses a problem in the optimal use of land and investment in land improvement measures. The state has a major unfinished task in terms of consolidation of holdings. Though the legislation in

this regard was enacted in 1956, its implementation started only in seventies and since then practically has not made any headway. With the average size of land holding shrinking as a result of increasing fragmentation, many marginal farms are becoming economically non-viable and oriented towards subsistence.

4. Modern Inputs

(a) Seed Sector

The adoption of modern varieties of cereals, particularly wheat and maize in the state is quite high. This is somewhat misleading because seed replacement rates are extremely low and varieties tend to lose their potential over time. For crops other than rice, wheat and maize, the situation is deplorable, Pulses, oilseed, fruits and vegetable, specialty crops like spices, aromatic and medicinal plant, and even fish seeds have to be procured from local sources or private traders. The State Seeds Corporation is not able to meet these demands either quantitatively or qualitatively. The extension system has also neglected these enterprises and there is little awareness among the farmers regarding improved varieties. Unless the seed sector is revamped, technological dynamism cannot come about (Kumar and Jha 2003).

(b) Fertilizer Use

Fertilizer use picked up in the state during 1980s. From nearly 22 kg of plant nutrients in 1982, it rose to nearly 63 kg per hectare in 1991. Though it continued to rise subsequently and has reached a level of 98 kgs in 2003-04, the rate of growth slackened during the nineties. The overall fertilizer response environment in the state is highly favourable—soil, rainfall and other climatic factors are conducive. Yet, fertilizer consumption in the state is far below that in states such as Punjab (178.6 kg), Haryana (141.6 kg), Uttar Pradesh (108 kg), West Bengal (120 kg), Tamil Nadu (152 kg), and Andhra Pradesh (153 kg).

5. Lack of Adequate Investment Flows

A serious impediment to Bihar's agricultural growth has been the shortage of investment flows from public and private sectors. The public investment measured in Rupees per hectare in Bihar is less than half of the national average. Declining public investments in agriculture is eroding the productivity potential of the state. Private investment flows to Bihar is also limited and private investment in agriculture cannot compensate for the decline in public investment and often involves inefficiencies (such as private investment in diesel generating sets) (Planning Commission, 2001).

6. Unfavourable Government Grain Procurement Policy

The Government of India's intervention in grain markets is regionally biased. Official procurement of foodgrains seems to be helping only a few states and concentrating their operations in already developed regions. It is evident from Table 13 that Bihar along with some other states like Gujarat, Madhya Pradesh, Karnataka and Maharashtra experienced sharp increase in marketed surplus of wheat after 1982-83. Similarly, marketed surplus of rice has witnessed substantial increase in several states like Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh and Orissa. But farmers in these states have not benefited from government procurement policy. It is striking to observe that more than three fourth of wheat that arrived in markets in Punjab (90 percent or higher) and Haryana (more than 80 percent) was procured by official agencies whereas the procurement of wheat did not take place at all in Bihar. In the case of rice, 84 percent in Punjab, 59 percent in Haryana and 66 percent in Andhra Pradesh was procured by official agencies in TE 1999-00 (Table 13). In Bihar the government procurement even in the case of rice is virtually nil. This shows very strong regional concentration of government intervention in selected few states and the farmers of Bihar were denied the deserved support. The popular justification of lack of adequate marketable surplus to require procurement by official agencies does not hold ground and this completely ignores the dynamic aspect of agricultural growth in the eastern region (Chand, *et. al.*, 2003).

Table 13

Percentage of market arrivals of rice and wheat procured by official agencies in various states

State	Rice		Wheat	
	TE 1991-92	TE 1999-00	TE 1991-92	TE 1999-00
Andhra Pradesh	65.0	65.7	-	-
Bihar	0.5	0.45	-	-
Haryana	77.4	59.3	82.1	80.1
Madhya Pradesh	56.2	31.1	-	11.4
Punjab	85.0	84.0	93.3	90.0
Rajasthan	78.0	8.3	12.0	38.8
Tamilnadu	42.9	28.4	-	-
U.P.	46.9	20.3	30.9	23.2
West Bengal	5.7	8.7	-	-
All India	50.9	41.5	61.5	49.1

Source: Bulletin on Food Statistics, Ministry of Agriculture, various issues; note: - indicates nil or negligible procurement

Table 14

Percentage of output marketed (crop-wise)

Name of the crop	Bihar	Punjab
Wheat	51.0	77.1
Paddy	15.4	97.8
Maize	66.4	66.4
Gram	56.4	-
Arhar	49.2	-
Khesari	61.2	-
Masoor	50.2	-
Mustard	27.8	70.9
Cotton	-	94.5
Sugareane	89.8	-
Potato	56.4	65.0
Onion	80.2	-
Other vegetables	31.4	91.0
Other crops	29.5	-
All crops	42.9	84.5

Source: Kumar and Sarkar, 2005

Table 15

Percentage of output sold through different marketing channels (Bihar)

Market Channel	Marginal	Small	Medium	Large	Total
Wholesale market	1.8	8.2	10.7	13.7	10.1
Local market	11.1	29.6	18	10.6	16.6
Villagers (directly)	34.4	32.5	31.8	16.7	26.9
Cooperatives	0	0.1	0.5	0	0.2
Government agencies	2.1	2	16.4	0	5.8
Intermediaries at farm	8	9.2	6.9	9.9	8.6
Pre-arranged contract	38.7	17	12.1	45.5	28.7
Others	4	1.4	3.6	3.7	3.3
Total	100	100	100	100	100

Source: Kumar and Sarkar, 2005

A study recently conducted at the Institute for Human Development by Kumar and Sarkar (2005) clearly shows that although Punjab farmers stand way ahead of Bihar farmers in terms of commercialization, Bihar farmers in fact are also generating sufficient amount of marketable surplus which substantiate our above expressed concern for the active participation of government led procurement in the state (Table 14). Further, Table 15 on marketing channels also expresses sorry state of marketing infrastructure for the agricultural commodities in Bihar. Only 10 percent of total marketed surplus was handled through regulated markets. Pre arranged contract and direct sale to the village were the major channels of sale, which together accounted for around 56 percent of total marketed surplus. It is apparent that the farmers in Bihar are still suffering by the nexus of credit-market inter-

linkages traditionally prevalent all over India. The marginal farmers who contributed a paltry amount in the market surplus suffered more by this nexus as their sale percentage to the regulated markets was observed to be even less than 2 percent.

7. Unfavourable Price Environment

In Bihar, the market system is in complete disarray. Consequently a very high amount of output is sold in the village or to the intermediaries at the farm itself. With this given market structure, it is evident that price received by farmers in Punjab for almost all crops were above that received by the farmers in Bihar (Kumar and Sarkar, 2005). The realized prices of all crops except vegetables were higher in Punjab compared to Bihar. In the case of wheat and paddy, the two major cereals for which procurement was done by the FCI, the realized prices were Rs. 628 and Rs. 580, respectively in Punjab and Rs. 587 and Rs. 452, respectively in Bihar. The realized price for wheat in Punjab was almost equal to the MSP price (Rs. 630) during the survey year, while paddy price was above the MSP price, the latter being Rs. 550 during the survey year. Thus, these figures clearly indicate that the realized prices in Bihar were much lower than the MSP prices announced by the government for these two crops, which occupied around 2/3rd cropped area in Bihar.

Table 16

Price received by the farmers for the main crops grown (Rs per quintal)

Name of the crop	Bihar	Punjab
Wheat	587	628
Paddy	452	580
Maize	390	550
Gram	1706	0
Arhar	1541	0
Khesari	929	0
Masoor	1673	0
Mustard	1524	1643
Cotton	0	2139
Sugarcane	69	0
Potato	306	242
Onion	451	0
Other vegetables	383	432

Source: Kumar and Sarkar, 2005

8. Acute Death of Agro processing Units

9. Research and Extension

Agricultural research and transfer of technology is a prime source of development. There is evidence to show considerable under-investment in agricultural R&D in the country (Pal and Singh 1997), the situation in Bihar is much worse. Research intensity, measured as proportion

of agricultural GDP spent on research is nearly one-fourth of the national average and investment per hectare is less than half. These are pre-bifurcation figures while the present Bihar picture would be even bleaker. There has been practically no real investment in the nineties, either in terms of finances or scientific manpower resources. The Rajendra Agricultural University is not even able to pay the salary of its truncated staff; had it not been for ICAR and other external resources, it would not have been able to conduct research at all.

Agricultural extension system in the country is in disarray and the situation in Bihar is worse. The maladies affecting the system are well-known. New initiatives have been taken to revitalize the transfer of technology in the form of Krishi Vigyan Kendras (KVK), Agricultural Technology Management Agency (ATMA), participatory extension, etc. What is needed is the reorganization and consolidation of extension in the state, along with de-bureaucratization and professionalization. The state has to seriously consider whether the agricultural university is a better home for the state extension service.

10. Governance and Institutions

All institutions concerned with agricultural and rural development in the state, whether government or autonomous, have become practically non-functional. This is partly attributable to lack of financial support, but gross operational inefficiencies, political interference and lack of professionalism also contribute. In almost all cases, the legal provisions governing the institutions have become outdated, irrelevant, or obstructive; the administration is insulated but downstream and vital functions have degenerated.

Specific institutions, which need to be targeted, are departments of irrigation, cooperation, agriculture, marketing, fisheries, soil conservation, animal husbandry, and land revenue in the government, and agencies like BISCOMAUN, Seeds Corporation, marketing federation, boards and committees, agricultural university, and other bodies created for specific tasks. Similarly, the development programmes of AH & VS have ceased to operate as the departmental breeding services for cattle have closed down. Out of 1376 AI centres, only 100 are functional (NABARD 2001). In almost all cases, there is a consensus on the major maladies and needed reforms. All these issues cannot be put in this report. We would only underscore the need for reform.

There is one danger, which needs to be noted, however. There is agreement all round that existing institutions are inadequate. At this point of time, few state governments have the financial resources to bale out many of these institutions, which have become non-performers because of resource scarcity. The response has been to privatize and/or to move through NGOs, which are low-cost units. Highly appealing justifications are offered. The danger is that we may go overboard on this idea. These are not substitute for hard reformist decisions in

public institutions. Against such a backdrop, Bihar State Milk Co-operative Federation (Compfed) stands as a beacon of hope for revival of other institutions. Compfed's growth has really been in geometric progression and its performance indicates that if institutions are run professionally, they can do wonders even in difficult situations.

Lack of coordination and integration of programmes of various departments results in dissipation of effort and inefficiency. Umpteen government departments and ministries are involved in agriculture and rural development; each of them needs resources to survive, regardless of the effectiveness or their activities. Providing for the salary component alone has become difficult for the state and to justify their existence, each entity claims and competes for the meager kitty of development resources. Consequently, resources are spread very thinly. A look at the 10th Plan proposals emerging from various departments demonstrates this vividly. We have a large number of activities, each of them too small to make a visible impact. (For example, see 'Work Plan for Development of Agriculture in Bihar, 2001-2002' Department of Agriculture, Government of Bihar). Hard decisions must be taken to address this problem based on a sectoral rather than departmental perspective.

11. Agrarian Structure

Historically one of the major factors behind the agricultural stagnation and overall backwardness of the state has been the exploitative agrarian structure (the state was under the Permanent settlement system of land tenure). Bihar was the first state in the country to abolish the zamindari system following independence and put an end to the much hated system of intermediaries between the actual tillers and the state. The first land ceiling Act was passed in 1962 with amendments in 1972 and 1973. The Bihar Tenancy Act of 1885 was amended in 1970 to safeguard the interests of the tenants with regard to eviction and rent. The government brought in a number of other legislative measures also with regard to the agrarian sector.

However, the implementation of the above laws has been far from satisfactory. The most glaring of cases are those of the Land Ceiling and Tenancy Acts. Several studies have shown how the provisions of the ceiling laws were grossly violated in various parts of the state. This is in sharp contrast with the neighbouring state of Bengal where the implementation of the laws was much more effective. Similarly, the tenancy laws have also been widely violated in the state where a fairly large area of cultivated land is under tenancy. The statutory provision with regard to the payment of rent is seldom observed in the rural areas, and there is a yawning gap between what is statutorily fixed and what the sharecroppers receive. The system of tenancy is almost entirely concealed and informal, and, hence, there is no security of tenure. Apart from land reform provisions, the implementation of Minimum Wages Act in rural areas is also extremely tardy (Sharma, 2005). The large scale failures of the land reform

measures as well as various government programmes have led to widespread discontent among the poor, which is manifested in the mobilisation of the poor peasants and agriculture labourers in large parts of the state. At the same time there has been large-scale migration of the poor also to other states in search of livelihoods. All these have led to a rather significant changes in the agrarian and rural structure of the state. This is amply captured by the resurvey of 12 villages by IHD at two points of time (1981-82 and 1999-00). There has been considerable change in the landholding structure over the years. Although there is still a large concentration of households among the landless and marginal farmers, concentration of land in the larger land class categories has come down considerably. The IHD study shows that during the 18 years landlessness has increased by nearly 3 percentage points (from 40 per cent in 1982 to 43 per cent in 1999-00). The proportion of marginal farmers with less than 1 acre of land has also increased by 5 per cent during the same period. On the whole, proportion of landless or households having less than one acre of land has increased from 66 per cent in 1981-82 to 73 per cent in 1999-2000. However, within the same period the proportion of households having 10 acres or more land has come down from 13 per cent in 1981-82 to 6 per cent in 1999-2000.

An important change witnessed during 1980s and 1980s has been somewhat substantial transfer of land from upper caste peasants to the middle caste peasants, particularly the dominant ones comprising Kurmi, Koeri and Yadav. Apart from limited land ceiling there have been three important factors contributing to land transfers. Some of the lower caste groups who have been migrating in large numbers from rural Bihar have been remitting one-third to one-fourth of their earning to the villages of their origin. Besides meeting consumption needs, in some cases these remittances have been the main source of land acquisition by the lower castes in recent years. Second, many of the members of the upper or middle caste or skilled labour households who have migrated as professionals, as formal sector employees and as businessmen have been selling their lands. Much of these land transfers are in favour of middle or lower caste households who are trying to acquire some land. The third source of acquiring land in many of the villages appear to be outright encroachment of public lands like river banks, and households of all castes are involved in this process of gaining access to land.

Besides this, over the years tenancy has shown an increasing trend in the state, at least in terms of the area leased in. This is despite the fact that Bihar is one of those states where tenancy is legally banned. According to the IHD study, approximately 22 per cent of all the rural households and as much as 40 per cent of the cultivating households are involved in leasing of land. According to the same study the total leased in area is approximately 25 per

cent of the total cultivated land. Moreover, the practice of leasing out is on the rise as it is not only the big land owners who lease out land but also many of the small and tiny landholders are increasingly resorting to the practice of leasing out. Seeing the overall practice of tenancy in the state, the IHD study finds that while leasing-in of land has been a source of livelihood for a number of land-poor households, in view of rising cost of cultivation leasing out is becoming an alternative option of sustaining agricultural practices. The increasing trend of tenancy is coupled with changing terms and conditions. Although share-cropping continues to dominate the lease market, over the years there has been marked increase in the proportion of fixed-rent leasing, while the leasing on the basis of labour services has almost vanished.

As mentioned above, the land issues have resulted into widespread conflict in rural Bihar which apart from social tension has also led to large tracts of land being uncultivated. The widespread oral tenancy has also resulted in the disincentives of the unprotected tenants in investing in land. All these have been responsible for slowing down the agricultural development.

VI. STRATEGIES AND POLICIES PRIORITIES

The first tier of priorities for Bihar's development covers infrastructural upliftment, covering both social (health, education) and physical (roads, power, communication) infrastructure. It will be necessary to identify priority regions and focus attention there.

Agricultural Investments

1. In terms of agriculture –specific investments, high priority must be accorded to development of markets, particularly regulation of markets for high value commodities (fruits, vegetable, spices, aquatic products, jute and other fibre crops) in addition to the conventional crops of the state.
2. Agricultural research is another area which faces severe resource constraints. A target of at least doubling the current level of investment in real terms must be set for the eleventh Plan. As mentioned earlier, agricultural extension services in the state are in disarray. Extension services in the state need a new agenda, a new face, and a new organization to establish complementary linkages with upstream R&D set up and downstream development apparatus. A major part of the information set is and will remain in public domain and the state cannot ignore its obligation in this regard. Neither the private sector nor NGOs can meet the variety or spread of these needs support will have to be provided for manpower, training and operational needs to rejuvenate the R&D sector.

3. Irrigation will continue to claim a high priority. In major and medium systems, the Eleventh Plan should focus on rehabilitation; in minor irrigation the accent should be on creating and maintaining capacity for lift and energizing tubewells. Drainage is an equally important part of water management, Irrigation, drainage and flood control need to be considered together in context of each watershed.

4. Diversification towards high-value enterprises—livestock, fisheries, fruits and vegetables, etc. will need to be carefully planned with reference to different areas and support systems will have to be so tuned. This must replace the present omnibus approach for the entire state. Animal health is another area where fresh look is needed. At the sometime establishing agro-processing units on a widescalĕ is a most alongwith reviving the existing rural industries such as sugar mills.

5. Agricultural statistics system in the state has literally collapsed and no objective decisions are any longer possible. Even fully centrally funded data collection activities are languishing. A rehabilitation of the agricultural statistics machinery is a pre requisite for any planning exercise.

Other Policy Thrust

An equally determined thrust will be needed to rationalize and reform the policy environment which has lost direction in recent times. The major areas of policy interventions are as follows:

1. Land related policies: Policies relating to land and water resources need rationalization. The land tenancy act, legal framework for exploitationand use of land and water resources, management or commons, incentives for agro forestry, reclamation of salt affected and eroded area, are some areas where clear guidelines are needed. Freeing of leasing of land needs serious attention. It may be helpful in improving land-use efficiency and attracting more investment to rural areas without jeopardizing the concern of equity. However, at the same time the recordings of the rights of the tenants and their protection are essential. Although the land holding has become small in large parts of the state because of demographic pressures, still in a few districts (e.g. Purnea, West Champaran, etc.) the existence of large land holdings is still reported. The government should make a drive for implementation of land ceilings in such areas. The land reform measures such as implementation of ceiling laws, access of the poor to common property resources in the village and protection of the rights of the tenants, are not only necessary for raising agricultural productivity but also for bringing out a

peaceful environment in the violent-prone rural Bihar. Land consolidation measures, which has been abandoned practically, need to be urgently taken up.

2. The rural credit system in general and the cooperative sector in particular has become defunct. The ills of the system are well-known and suggestions on revitalization abound.

3. Marketing regulations in the state, including the agricultural regulated markets act, need drastic modifications. A systematic framework and enabling legal and official perspective will be essential.

4. There is no coherent policy in the area of non-farm business and agro processing. These sectors will play critical role in accelerating agricultural and rural development in the state. Sugar, jute, fruits and vegegables, dairy, meat and fish, animal feed etc. could form the nucleus of a vibrant agro-industry sector in the state. These evolve best in a market driven climate, providing incentives and enabling conditions should be the main objectives of policy.

5. Most of the public institutions in the state have collapsed, and there is a growing feeling that these should now be entrusted to private sector or NGOs. State withdrawal from extension, input management, support services like soil testing, pest and disease surveillance, credit, market development, etc. will leave a void which cannot be covered by alternative structures. What is really needed is a careful appraisal of alternatives, and, more importantly, a complete overhaul of the policy and legal framework governing critical institutions.

References

Chand, Ramesh (2004); "*India's National Agricultural Policy: A Critique*", Disucssion Paper Seires No 85/2004, Institute of Economic Growth, Delhi University Enclave, Delhi.

Chandramohan C., Chitranjan and Sharat Kumar (2001), *Dynamics of Foodgrains production*.in Sharat Kumar and Praveen Jha (eds) *Development of Bihar and Jharkhand-Problems and Prospects*. Pp 92-118 Shipra Publication, New Delhi.

Datta, S K and Milindo Chakrabarti (1999), *A Perspective on Land Use Planning for Eastern India.in T.Haque (ed) Land Use Planning in India Pp 46-89 National Centre for Agricultural Economics and Policy Research, New Delhi.*

Fan, S., Peter Hazell and S. Thorat (1999), *Linkages Between Government Spending, Growth and Poverty in Rural India, Research Report 110*, IFPRI, Washington.

Government of India "Commission for Agricultural Costs & Prices", Department. of Agriculture & Cooperation, Ministry of Agriculture, New Delhi. Various issues.

Government of India, "Agricultural Statistics At a Glance", Directorate of Economics & Statistics, Department of Agriculture & Cooperation, Ministry of Agriculture. New Delhi. Various issues.

Government of India, "Area Production of Principal Crops in India", Directorate of Economics & statistics, Department. of Agriculture & Cooperation, Ministry of Agriculture, New Delhi. Various issues.

Government of India, "Bulletin on Food Statistics", Dept. of Agriculture & Cooperation, Ministry of Agriculture, New Delhi. Various issues.

Haque, T (2000), *Contractual Arrangements in Land and Labour Markets in Rural India, Indian Journal of Agricultural Economics, vol 55 (4): 233-252.*

Jha T N and K U Viswanathan (1999), *Problems and Prospects of Agricultural Development in Bihar,* Occasional Paper-10, National Bank for Agricultural and Rural Development, Mumbai.

Kalirajan, K.P. and R.T. Shand (1997), *Sources of Output Growth in Indian Agriculture, Indian Journal of Agricultural Economics, vol 52 (4): 693-706.*

Kumar, Alok (2001), *Agricultural Development of Bihar*, in K P Kalirajan, G. Mythilli and U. Sankar (eds) *Accelerating Growth through Globalization of Indian Agriculture, Macmillan India Ltd., New Delhi pp167-195.*

Kumar, Anjani (2000), *Performance of Livestock Sector in India: Implications for Food Security". Afro-Asian Journal of Rural Development: 33(2):77-9*

Kumar, Anjani and Jha, Dayanatha (2003), "*Agricultural Development in Bihar: Performance, Constraints and Priorities*", A Mimeo, National Centre for Agricultural Economics and Policy Research, New Delhi,

Kumar, P., Anjani Kumar and Surabhi Mittal (2004), Total Factor Productivity of Crop Sector in the Indo-Gangetic Plain Of India: Sustainability Issues Revisited, *Indian Economic Review,* Vol. 39, No.1, pp. 169-201.

Kumar, Parmod and Sandip Sarkar (2005), "*Economic Reforms and Small Farms in Bihar and Punjab: Implications for Production, Marketing and Employment*", Institute for Human Development, New Delhi, Mimeo.

Kumar, Praduman (2001), *Agricultural Performance and Productivity*, In S S Acharya and D P Chaudhary (eds), *Indian Agricultural Policy at the Crossroads, Rawat Publications, New Delhi pp353-431.*

Murgai, Rinku (1997), *Diversity in Economic Growth and Technical Change: A Districtwise Disaggregation of the Punjab and Haryana Growth Experience,* Unpublished PhD thesis submitted to the University of California at Berkeley

NABARD (2001), *Report of the Expert Committee on Rural credit*, National Bank for Agricultural and Rural Development, Mumbai.

Pal, Suresh and Alka Singh (1997), *Agricultural research and extension in India: Institutional structure and Investments, Policy Paper no. 7*, National centre for Agricultural Economics and Policy Research, New Delhi.

Pal, Suresh, S. Pandey and Abedullah (2000), *Growth and variability in agriculture revisited: district-level evidence of rice production in eastern India,* in S. Pandey, B.C. Barah, R.A. Villano, and S.Pal. (eds) Conference Proceedings on Risk Analysis and Management in Rainfed Rice Systems.

Planning Commission (2001), *Approach Paper to the Tenth Five Year Plan (2002-2007)*, Planning Commission, Government of India, New Delhi.

RBI, *Report of the Committee on Agricultural Productivity in Eastern India*, Vol. I, 1984.

Roy, B. C. (1997), *Growth and Prospect of fruit and Vegetable Processing Industry in India,* Bihar Journal of Agricultural Marketing, Vol. 5(3):356-65.

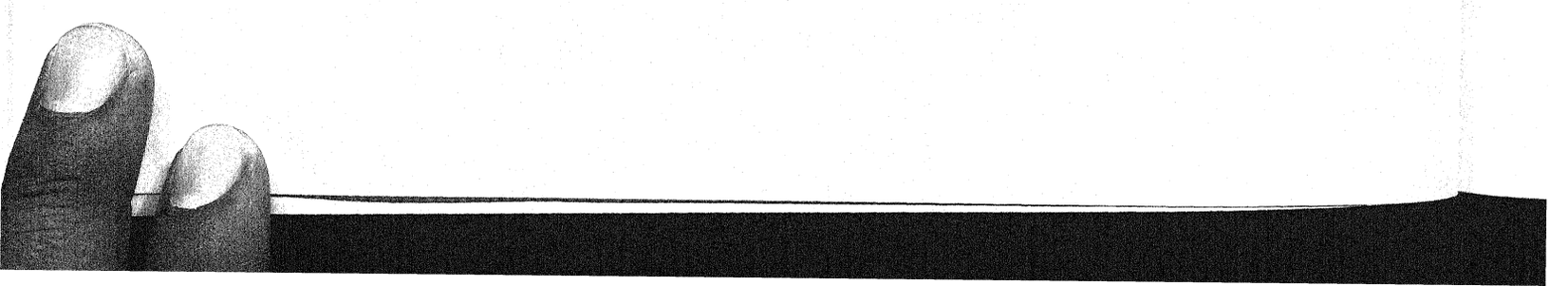
Sharma, Alakh N. (2001), *Poverty, Employment and Human Development in Bihar* paper presented in a seminar on *Bihar's Strategic direction for Economic Development* during 23-24th May, 2001.

Singh, RKP (2001), *Economic Analysis of total factor productivity of irrigated agriculture by district and region,* Technical report submitted to National Agricultural Technology Project (NATP).

Singh, RKP and K.K. Prasad (2001), *Fish production in north Bihar: An Economic Analysis,* Agricultural Economics Research Review vol.14 (1): 65-73.

State Focus Paper on Bihar (2001), National Bank for Agricultural and Rural Development, Mumbai

Yadav, C.P., B.S. Gupta and S. Kumar (2000), *Export Potential of Agriculture,* in Jagdish Prasad (eds), *Export Potential of Indian Agriculture,* Mittal Publications PP113-19.



AGRICULTURAL DEVELOPMENT IN WEST BENGAL : PERFORMANCE AND PARADOXES

By

SUDHIN K. MUKHOPADHYAY

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



AGRICULTURAL DEVELOPMENT IN WEST BENGAL: PERFORMANCE AND SOME PARADOXES

Sudhin K. Mukhopadhyay

"Agriculture is our foundation, Industry is our future."----Government of West Bengal.

-I-

Since independence Indian agriculture has come a long way in terms of both growth and structural change. Agricultural growth and transformation has varied widely across regions, at different times and in different products. In terms of agricultural development the Eastern region had for long been trailing behind most other regions. However, since the early eighties the state of West Bengal virtually broke off from the slumber and recorded impressive performance in agriculture. The innovative land reforms, pro-active policy changes, successive years of benign weather, and technological changes – all combined to contribute to this performance. Notwithstanding the growth record, scholars have not been unanimous as to the contributions of specific causes (e.g., institutional change vs. technology), impacts (upon rural income, employment, poverty and wellbeing), and sustainability of the process of agricultural growth and transformation in West Bengal. My objective in this note is to briefly review and understand some of the salient features of this process of agricultural growth in recent decades. In the following pages agricultural growth and diversification in West Bengal is examined focusing on selected major items. This is followed by a review of the likely correlates and impacts of agricultural development upon the agricultural and rural sector of the state. In the process of this exploration I raise some issues and present some paradoxes that should call attention for inquiries to advise and assist needed policy interventions. I conclude by asking how far it would at best be premature to proclaim that agriculture has already served its function as the 'foundation' for shifting policy focus now to industry as the 'future' of West Bengal.

This is a preliminary draft subject to revision in the light of comments and suggestions. The author is thankful to Dr. Debatra Dey for tireless help and assistance. Thanks are also due to Professors B. Ghosh, A. Mitra and A.Kundu for many useful suggestions.

-II-

West Bengal produces a number of foodgrains as cereals and pulses. Among these, *Rice* is the most important crop contributing about 90 percent of total foodgrains produced in the state. Since 1950-51 till the turn of the century rice production in West Bengal increased at a trend rate of growth of more than 2.5 percent per year (Mukhopadhyay 2001). The overall trend had several turning points at different points of time. Three such major points can be identified: (i) the Green Revolution in 1966-67; (ii) the Land Reforms policy implementation in 1977-78; and (iii) initiation of economic reforms in 1990-91. Also, empirically it is observed that, following a declining phase since 1976-77, food and agricultural production had a sharp upward shift in 1982-83. Dividing the period 1966-67 to 1999-2000 into four sub-periods, it appears that during pre-Green revolution period, 1950-51 to 1966-67, trend rate of growth of rice production was 2.07 percent per year. The period, 1966-67 to 1976-77 was the phase when the new technology was in an early stage, and its adoption was still low. During this phase rice production grew at a trend rate of growth of 2.15 percent per year. During 1977-78 to 1982-83, the period of implementation of the land reform policies in the state, agriculture seemed to have been affected by uncertainties and there was virtually no significant trend of growth in rice production. Wide fluctuations and severe drought characterized production, and by 1982-83, it plunged to levels as low as experienced two decades ago. Remarkable, however, subsequently during 1982-83 to 1989-90, rice production grew at the unprecedented trend rate of more than 8 percent per year. Finally, during 89-90 to 1999-2000, the period of economic reforms, rice production growth again came down to 2.3 percent per year.

Table I: Trend Rate of Growth (% per year) of Rice Production in West Bengal

Period	1966-67to 76-77	1976-77to 1982-83	1982-83 to 1989-90	1989-90to 1999-2000
Rice production Growth Rate percent per year	2.14	-3.36	8.85	2.33

Data Source: *Economic Review*, Government of West Bengal

The growth performance of *total foodgrains* production in West Bengal presents a scenario quite consistent with the growth in rice production. During 1972-73 to 1980-81 trend rate of growth per year was negative (-1%). But, as in the case of Rice, during 1980-81 to1989-90, the growth rate of total foodgrains production shot up to 4.9 percent, followed by a lower rate of 2.38 % during 1990-91 to 2002-03. For the over all period, 1974-75 to 2002-03, total food grains production grew at a trend rate of growth of 2.57 percent (Table II).

Table II :Trend rate of growth (% per year) of total Foodgrains Production in West Bengal

Periods	1974-75 to2002-03	1974-75 to1980-81	1980-81to 1990-91	1990-91to2002-03	1994-95 to2002-03
Growth of foodgrains Production	2.57	-1.00	4.9	2.38	2.52

Data Source: *Economic Review*, Government of West Bengal

During the period under review agriculture in West Bengal has witnessed significant change in product composition. Side by side with increased food grains production, several nonfood grains and non-crop farm products also emerged as important components in the state's agricultural product basket. Among the leading nonfood crops grown in the state the most impressive record has been in the production of *Oilseeds* which increased from about 60,000 tones in 1971-72 to as high as 4500,000 tones in 2002-03. This phenomenal growth in Oilseeds was facilitated by both technological change in agriculture as well as favourable relative prices (Mukhopadhyay, *ibid*). *Vegetable production* in the state increased more than three and half times from 1971-71 to reach a figure of 11,000 ('000) tonnes in 2003-04. *Potato* is another non food product production of which increased from about 1500('000) tonnes in the '70s to more than 7000('000) tonnes in 2003-04. Among the important non crop farm products in West Bengal *Milk, Fish and Poultry* recorded impressive growth. Milk production more than doubled from 1721(000) in 1982-83 to 3700 (000) tonnes in 2003-04. Fish production increased from 370 (000) in 1980-81 to 1170 ('000) tonnes) in 2003-2004.

Production of Eggs grew by about 25% from 2279(million) in1990-91 to 2830 (million) in 2003-04.

In terms of *area cultivated,* the index for foodgrains area increased from 6154('000ha) in 1971-72 to 6685('000ha) in 2003-04 whereas total area under non foodgrains (excluding Fiber and Plantation crops land under which remained virtually unchanged) increased from 950 ('000ha) in 1971-72 to 1500 ('000 ha) in 2003-04. HYV technology (based on seeds, water and fertilizer) was available and used mostly in foodgrains resulting in output growth. West Bengal has about doubled the percent of gross cropped area irrigated from 22%in 1971-72 to 43% in 2003-04. *Fertiliser* consumption per ha of Gross cropped area increased from 17.4Kg in 1975-76 to 122Kg 2003-04. *Cropping intensity* Index also increased from 106 during 1971-72 to 178 in 2003-04.

-III-

The foregoing discussion shows that, although subject to variations from time to time, West Bengal agriculture has indeed achieved an impressive record of growth and diversification since 1971. Following a phase of stagnation, unprecedented growth was recorded during the eighties. During the nineties, however, growth rate declined. Significant diversification took place during this period, from food grains to non-food grains and from crop to non-crop farm production. Implications of this phenomenon are expected improvement in employment, income, consumption and overall well being of the agricultural and rural population relative to urban. One would also expect that the impacts of West Bengal's agricultural performance should reveal itself more prominently than in states where such developments did not take place. An earlier study by this author (Mukhopadhyay, *ibid*) showed that these expectations were largely validated till the beginning of the nineties. However, cautions were felt necessary about the sustainability of this growth, particularly in respect of social, economic and environmental implications. Our objective now would be to explore how far the some of these expectations and apprehensions were true.

Let us first look at the pattern of *employment and work force* in rural West Bengal. According to the Census of India, during 1991-2001 the share of farm employment in

total workforce declined from 71% to 58% while non-farm employment increased correspondingly from 29% to 42%. Among farm workers the share of 'Cultivators' decreased from 38 to 25% during 1991-2001 while the all India average share of cultivators was much higher at 40%. In regard to the share of 'Agricultural labourers', it remained almost the same during the decade in West Bengal as well as in India as whole. In West Bengal the decline in the share of farm workers was filled up mostly by increase in the category of "Other Workers", with a marginal increase in the share of "Household Industry" workers.

Total share of non-farm workers in 2001 was 42% in West Bengal against 26% in India as a whole. Thus both over time as well as in comparison with all India average, the share of non-farm workers in West Bengal was significantly higher compared to farm workers. Agricultural performance in West Bengal has been characterized by the phenomenon of a declining proportion of farm workers highlighted by sharp decline in the share of Cultivators with corresponding increase in the share of non-farm workers dominated by Other Workers (Table III).

Another distinctive feature of Rural Workers in West Bengal compared to India as a whole, as revealed in the National Sample Survey 58th Round data, is the broad similarity in its distribution among Self-Employed (*54% in West Bengal and 56% in the country)*, Wage/Salary Employees (*6% in West Bengal and 7% in India*), and Casual labour *(40% in West Bengal against national average of 37%),* (Table IV).

It appears that the significant agricultural performance in West Bengal has been associated with a clear transformation in its rural workforce distribution both over time and compared to the national scene. The clearest finding is that the proportion of Cultivators and that of total farm workers have declined with little change in the share of agricultural labourers so that in 2001 West Bengal absorbs a much lower proportion of its rural workers (25%), compared to 40% in India as a whole. The decline seems to have been balanced by rise in the share of total non-farm workers. In 2001 again, rural non-farm workers' share was 42% against only 27% in the country. One might wonder as to where in West Bengal did these cultivators go, especially during the phase of land reforms and unprecedented agricultural growth? Did they join the Household Industry and/or the 'Other Workers' category? If so, how to explain this shift? Is this shift induced

by 'distress' or higher economic incentives? What are the comparative benefits and costs of belonging to this rather than to the 'casual' or 'wage earners' category? Assuming that 'Household Industry' and 'other worker' categories of rural workers are mostly informal, unstructured/unorganized, what are the social and economic implications of this phenomenon (Sarkar 2006)?

Table III: Occupational Distribution of Rural Workers: West Bengal & India

	West Bengal		India
	1991	2001	2001
Cultivators	38.4	25.36	40.14
Agricultural Labourers	32.27	33.04	33.20
Total Farm	70.67	58.4	73.34
Household Industry Workers	4.59	7.8	3.77
Other Workers	24.74	33.8	22.9
Total Non-Farm	29.33	41.6	26.67

Source: Census of India

Table IV: Distribution of Rural Persons By Usual Activity (Principal and Subsidiary)

	West Bengal	India
Self Employed	55	59
Regular Wage Employee	7	7
Casual	38	34

National Sample Survey (58th Round July-Dec.2002) Report No.484.

Looking for some light on this issue, one might take recourse to the recent NSS Report (N0.496 'Some Aspects of Farming', 2003). The Report shows that a mere 54 per cent of farmer households in West Bengal 'like farming', while the national average is 60 per cent. In this respect West Bengal is below most of the sates, except only Bihar, Chattishgarh, Jharkhand and Orissa. Why don't the 46 per cent of farm households in West Bengal 'like farming'? In reply, 36 per cent of West Bengal farmers say it is 'not profitable', against only 27 per cent for India as whole. In this respect West Bengal farmers clearly tops the list of all sates. Interestingly, very few of the farmers in West Bengal would suggest they don't like farming because it is 'risky' (5 per cent against 8 per cent in the country). Again the question arises as why is this so? Why is farming less profitable in West Bengal than in most other states? If this is so, what should be the policy implications?

During 1970-71 to 2001-02 the contribution of agriculture to the State Domestic Product of West Bengal declined from about 42 per cent to 23 per cent. For India as whole also the share declined almost similarly from 47 per cent to 25 per cent during the period (Table V). This suggests sharp decline in the importance of agriculture in the national economic scene notwithstanding the strongest ever emphasis on this sector in a period of rather low industrial growth. Perhaps an explanation of this phenomenon of this fact could be used as support for the declaration of this sector as the 'foundation' for industrial growth.

Table V : Share of Agriculture in State Domestic Product

	West Bengal	India
1970-71	41.45	46.59
1978-80	40.92	41.33
1988-90	30.48	35.66
2001-03	22.84	25

Source: Economic Review, GOWB

Lastly, let us look at some of the basic indicators of the quality of life of the rural population of West Bengal compared to India as a whole, focusing on rural-urban differences. Data present another set of paradoxes in the face of the proclaimed

transformation of West Bengal's agriculture as the foundation for projected industrial resurgence (Tables VI and VII). First, the disparity between urban and rural per capita consumption in West Bengal is not only higher than the national average, it has systematically increased over the period of striking growth of agriculture, from 1.60 in 1983-84 to 1.90 in 1990-00, when the national ratio was 1.75. In 1999-00 eighty four per cent of rural households were poor compared to 74 per cent in India as a whole. Consistent with this, in 1993-94, several years after the peak was reached in agricultural growth, the proportion of rural households with pucca houses was only 16 per cent in West Bengal while about double that ratio (29 per cent) of rural households enjoyed pucca houses in India as a whole. The question repeats itself, should not one expect the fruits of a vibrant agriculture to spread to rural household as a whole and lead to shared overall rural prosperity? In the absence of this can the growth be sustainable and serve as the foundation of industry?

Table VI: Wellbeing of Rural Population

	West Bengal	India
Per Capita Consumption :U/R Ratio		
1983-84	1.60	1.47
1993-94	1.70	1.62
1999-00	1.90	1.75
Percent of poor in Rural Household(1999-2000)	84	74
Percent of Rural Household with *pucca* house(1993-94)	16	29

Source: India Human Development Report, 2001

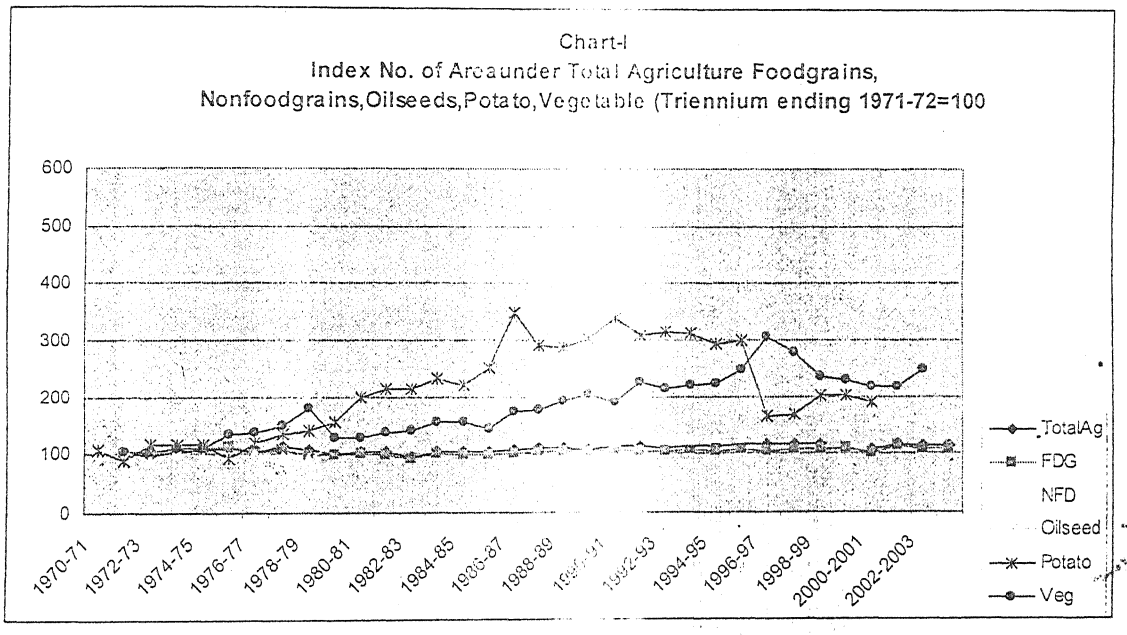
Table VII: Percent Population below Poverty Line

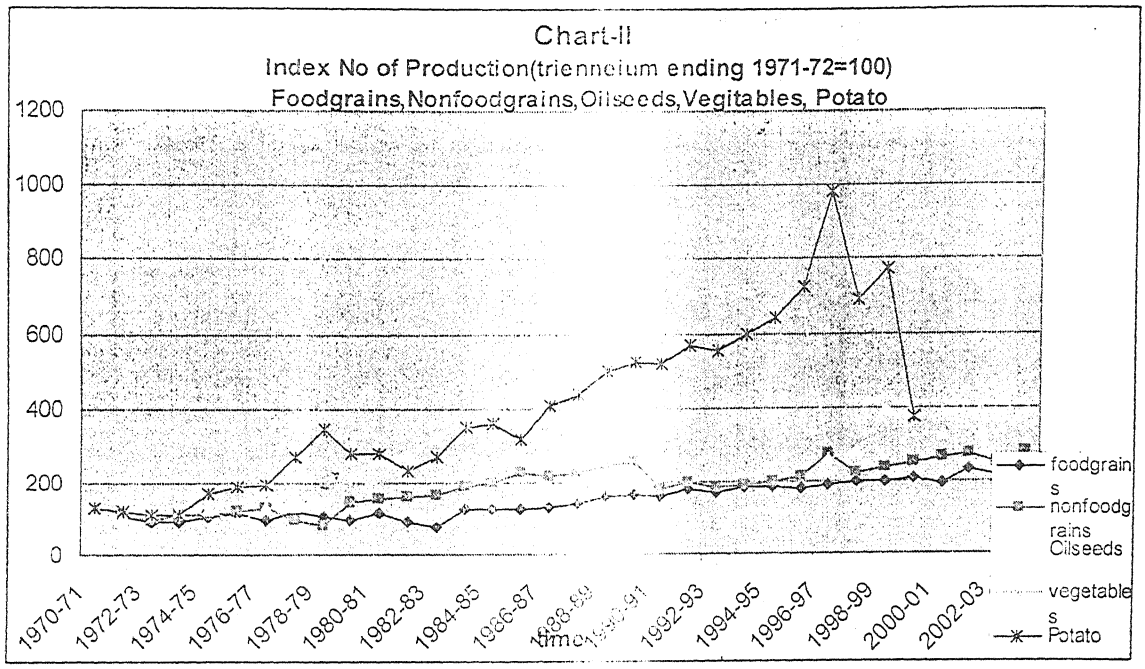
	1983-84			1993-94			1999-2000		
	Rural	Urban	R-U Ratio	Rural	Urban	R-U Ratio	Rural	Urban	R-U Ratio
WB	63	50	1.26	41	22	1.86	32	15	2.13
India	46	41	1.12	37	33	1.12	27	24	1.13

Source: India Human Development Report, 2001

-IV-

In this brief note I have attempted to present a scenario of agricultural performance in West Bengal focusing primarily upon some basic aspects and parameters. I have shown, as many other studies have done, that the often repeated common assertion of an impressive performance on the agriculture front in West Bengal is largely valid. But going to explore and understand some of the less explored correlates and impacts of this brilliance of agriculture, I come upon some simple questions and apparent paradoxes. I do not venture here any hypotheses, not to mention any solutions. My intention is to raise these issues in order to invite intensive rigorous inquiries designed to assist formulation and implementation of policies for long-term sustainable development.




Chart-II
Index No of Production(triennium ending 1971-72=100)
Foodgrains,Nonfoodgrains,Oilseeds,Vegitables, Potato
1200
1000
800
600
400
200
0
1970-71
1972-73
1974-75
1976-77
1978-79
1980-81
1982-83
1984-85
1986-87
1988-89
1990-91
1992-93
1994-95
1996-97
1998-99
2000-01
2002-03
time
foodgrains
nonfoodgrains
Oilseeds
vegetables
Potato

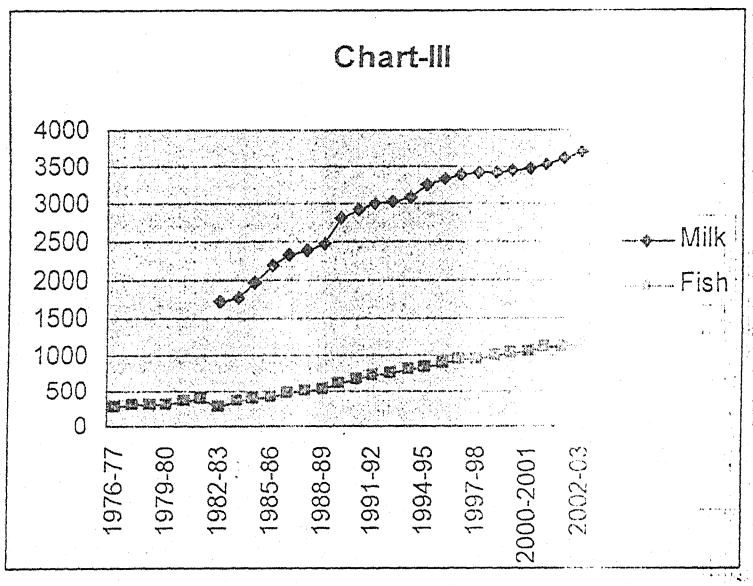

Chart-III
4000
3500
3000
2500
2000
1500
1000
500
0
1976-77
1979-80
1982-83
1985-86
1988-89
1991-92
1994-95
1997-98
2000-2001
2002-03
Milk
Fish

Chart-IV
Consumption of Feriliser('000 tonnes)

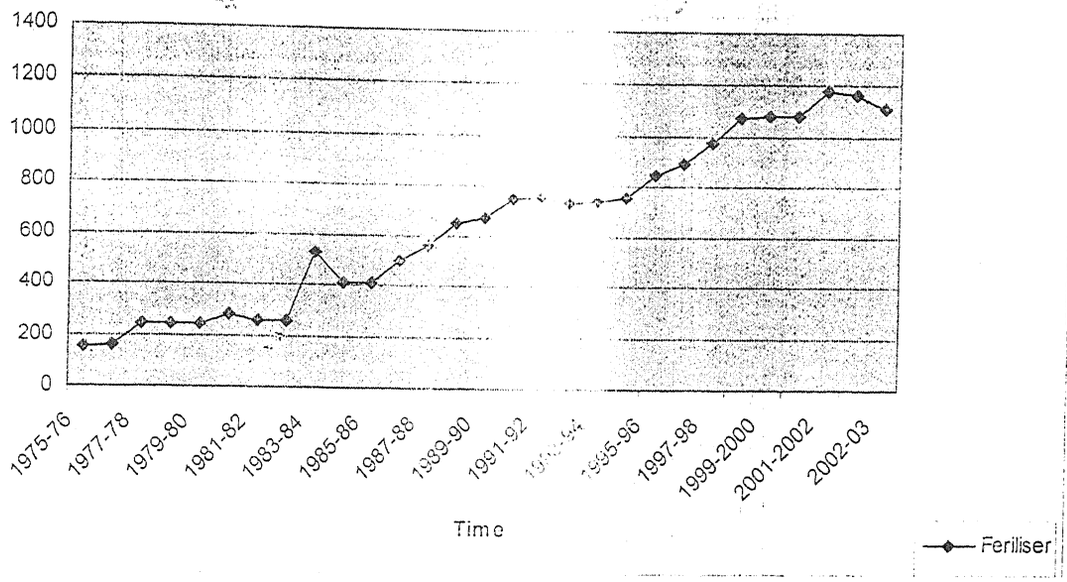
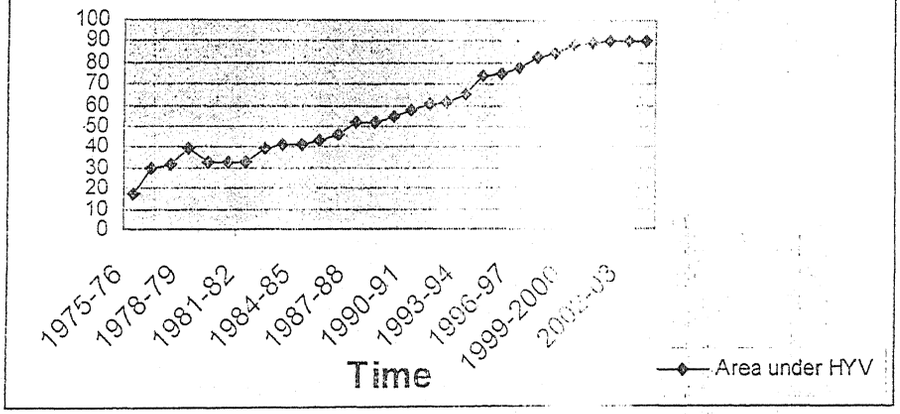


Chart-V
Percent Area under HYV



PERFORMANCE OF AGRICULTURE IN GUJARAT : SOME RECENT EVIDENCE

By

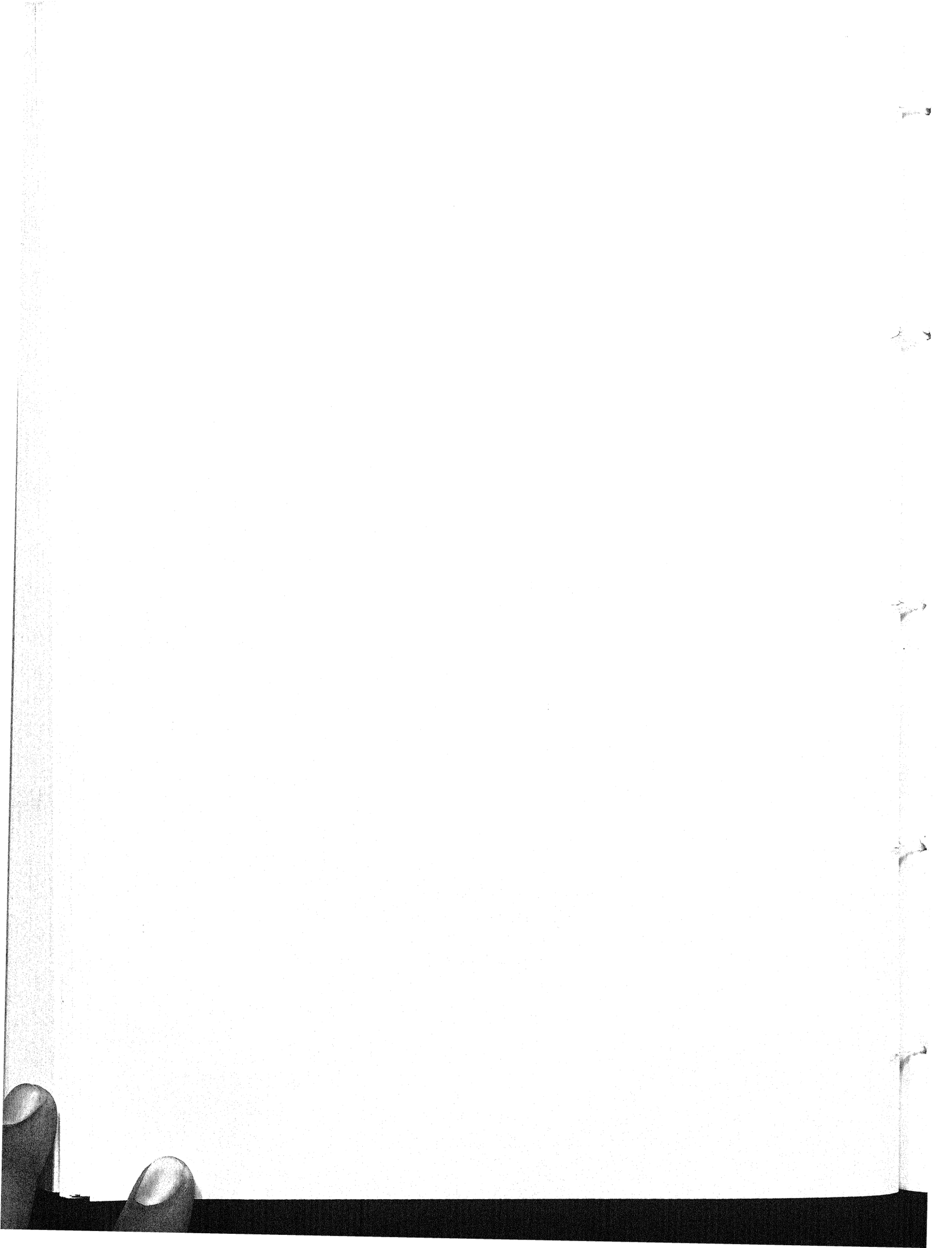
NITI MEHTA

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Performance of Agriculture in Gujarat: Some Recent Evidence

Niti Mehta[1]

I. Introduction

Gujarat has been celebrated as one of the dynamic regional economies of India, with an above average net state domestic product (NSDP) and its growth rate. The growth rate of its NSDP has remained stable at 4.6 percent in the '70s and '80s, rising to 6.6 percent in the last decade. The state has responded well to the economic reforms sweeping the country, but a glaring and increasing regional imbalance is being witnessed with regard to the per capita income and employment growth pattern. Post liberalization, great regional disparities in the levels of development were seen, with an observable bias in favour of developed regions and better –off sections of the populations (Hirway, 1995). An alarming off-shoot of the ongoing process is the distortion of the agriculture-industry linkage in the state, coupled with severe resource degradation. Even across the sectors the growth pattern has been far from uniform. Primary sector has been stagnant or even declining in the state, a process which got initiated in the '80s.

It needs mention that Gujarat displays considerable heterogeneity in terms of agro-meteorological and climatic conditions, soil and moisture regimes. The cultivation of crops in each of its seven agro-climatic regions is conditioned by water availability and other natural phenomenon. The regional differences in agricultural development on account of resource endowments for the state have been assessed at the level of the districts. The period covering the years 1961-63 to 1991-93, incorporating both the pre- and post- green revolution periods of agriculture development were focus of an earlier study for the state. In the former phase land reforms and development of large scale irrigation infrastructure were emphasized. Agricultural breakthrough was attained in mid sixties with intensive use of new seed- fertilizer technology. Even though this was initially confined to the irrigated north-western part of the country, it led to tremendous increases in wheat and later on, rice yields. The technology gradually spread to larger areas, thereby reducing the regional disparities. Later on intensity of fertilizer use and other inputs increased even in the rainfed areas, with visible rise in output. Rainfed areas too witnessed increasing diversification in the cropping patterns and shifts from coarse cereals to oilseeds. However since the onset of reforms after 1991, several changes have taken place across all the production sectors. Thus it is prudent to have a closer look at the pattern of agriculture development in the state in the post-liberalisation phase.

The specific objectives of the present paper would be to analyze pattern of agricultural development, to analyze impact of technology on yield levels during the pre and post liberalization periods and to examine growth of agricultural productivity of workers engaged in agriculture sector.

The information on area and output for the crops used in this present study, has been compiled from season and crops reports, published by the Department of Agriculture, State Government. The analysis has been conducted for 17 major crops and crop groups. Crops covered are rice, wheat, *bajra, jowar*, maize, other cereals, total cereals, *tur*, other pulses, total pulses, total

[1] Associate Professor, Sardar Patel Institute of Economic & Social Research, Ahmedabad. The author wishes to thank Professor SP Kashyap for his guidance and Professor NC Shah for useful comments.

foodgrains, groundnut, mustard, other oilseeds, total oilseeds, cotton and sugarcane. These crops together shared 88.9 percent of the gross cropped area in TE 1963, 78 percent during TE 1993, the share falling to 74 percent in 2001-03. Shifts in the cropping pattern are apparent from this analysis, but lack of information about "other crops" such as spices, fruits, vegetables, medicinal plants etc inhibits their inclusion in the analysis. This perhaps would have made the analysis more comprehensive.

The first triennium captures the picture prevailing before introduction of green revolution, while the subsequent periods (TE 1973 upto TE 1993) depict the changes taking place with the advent of new technology and resulting crop diversification. These together constitute the pre-globalisation phase. The period from 1993 onwards is considered the phase after the advent of reforms, to study the changes in pattern of agricultural development and growth. The paper takes advantage of the recent information available and to a large extent updates the earlier paper co-written by the author (Mathur & Kashyap, 2000). The value of output for crops has been estimated at 1990-93 prices. Growth of output, changes in districts and estimates of productivity level have been ascertained using this aggregate value of output, for the selected crops only.

II. Overview

Agriculture in Gujarat is marked by erratic and uneven rainfall, that often leads to scarcity conditions especially in Kutch and parts of Saurashtra. The southern districts of the state generally receive high and assured rainfall, central districts medium and less assured rainfall, and northern districts, Saurashtra and Kutch receive scanty and more irregular rainfall. The C.V. of annual rainfall ranges from 20.9 to 73.2 percent across the state (Joshi, 1996). The state faces a problem in water availability, which is also manifested in its irrigation development. Of the net cropped area 27.3 percent was irrigated in 1994, by 2001-03 the magnitude increased to nearly 30.5 percent. Over time irrigated farming is becoming important. Irrigation through dug wells and tube wells accounted for as much as 88 percent of all the sources combined in 2001-03. Surface irrigation, particularly canals are common in the southern Gujarat districts of Bharuch and Surat and also in Dangs and Valsad comprising the southern hills sub region. Ground water has been over exploited with many talukas reaching a critical level. The available unexploited potential is largely for surface irrigation, pointing towards the need for development of watersheds and major and medium irrigation facilities.

Bagchi et.al (2005) in their study on growth and structural changes in the economy of Gujarat, spanning a 30 year period upto 2000 have made the following observations with regard to the state's primary sector:

"the total income originating in the primary sector was Rs. 711944 lakh in 1970-71 and with severe fluctuations reached at Rs. 1214038 lakh in 2000-01, showing a trend growth rate at around 1 percent...the trend growth rate in agriculture were negative in the 1980s and 1990s... The liberalization of the 1990s had hardly any significant perceptible impact on the growth performance of the primary sector in the state."

"the secondary and tertiary sectors have shown statistically significant and high rates of growth over the whole period including the sub-periods".

"...the economy of Gujarat grew in an unbalanced and volatile fashion...apparently this growth has had no positive impact on the primary sector. This indicates a peculiar disarticulation between the primary and secondary sectors"

The analysis of data on broad industrial groups in the state domestic product further reveals that:

"The share of agriculture, the major constituent of the primary sector, has steadily declined from 45.2 % in 1970-71... to 13.4 % in 2000-01. In common with the experience of the other states of India, the percentage of people employed in agriculture in Gujarat has declined much more slowly than income generated by it... it continues to be the major source of employment". The change in the percent contribution of the primary sector in the NSDP from 1987-88 to 1999-00 was -21.7 percent, while the percent change in employment share over the same period was -6.1 percent. During 2001 agriculture in Gujarat engaged 52 percent of the total workforce, and 13 percent of the state domestic product originated from it. This is bound to have damaging implications for the people engaged in it. This also indicates that the economy is witnessing structural transformation.

There is a decline in the share of cereals and foodgrains, giving way to non foodgrain crops as oilseeds, spices, horticultural crops etc. or the non traditional, nonfood crops. Gujarat is predominantly a non food crop economy with preponderance of groundnut, tobacco and cotton. In the recent decade, commercial orientation is more associated with oilseeds, sugarcane, vegetables, spices etc. Area under cereals such as rice, wheat, bajra and jowar has decreased. The rise in the share of superior cereals of rice and wheat had been only marginal in Gujarat upto the early 80s, thereafter these are witnessing steady decline in area. A notable feature of cropping pattern changes in the recent times is the significantly enhanced share of other crops, occupying more than a quarter of gross cropped area (GCA). The agriculture in the state is on the whole diversified, with cropping pattern that is quite suitable to agro-climatic conditions.

III. Changes in Area and Cropping Intensity

Before embarking on detailed discussion on state of agriculture development in Gujarat it would be prudent to look at the changes in area. Area increase has the components of increase in the net sown area as well as rise in the intensity of cultivation. As most of the cultivable land has been brought under cultivation, the net sown area in the state has ceased to grow. The gross cropped area also expanded, at the very low rate of 0.71 percent. In the pre-green revolution phase, between 1961-63 to 1971-73, the cropped area at state level grew marginally at 0.10 percent. In the next phase of 1971-73 to 1981-83, there was a slight acceleration in cropped area at 0.72 percent per annum due to expansion in the net sown area. The growth was high in the Saurashtra districts, namely, Bhavnagar, Jamnagar, Junagadh as well as in Kheda, Valsad and Mehsana. Expansion of net sown area, as well as climatic conditions enabled the increase in the intensity of cultivation. During 1981-83 to 1991-93, as compared to the previous decade, there was a perceptible decline in the growth rate of cropped area from 0.72 to -0.18 percent per annum. It is evident that growth in cropped area over time had ceased to be a major constituent of the increase in the crop output in the state upto early 1990s. The post liberalization scenario too has

not witnessed any major expansion in the overall cropped area, with the growth rate showing a marginal rise at 0.04 percent.[2]

Increase in cropping intensity contributes to the growth of cropped area, in addition to the spread of net sown area. At the state level, the cropping intensity increased from being 1.05 in 1961-63 to 1.13 percent during 1991-93. Up to the early eighties, the cropping intensity recorded an appreciable increase in all the districts. Cropping intensity in the eighties declined in certain districts due to weather and rainfall adversities, particularly in all the districts belonging to Saurashtra sub regions. By 2001-03, the cropping intensity in fact declined from 1.13 % to 1.11 %, with a noticeable rise only in a few pockets in middle and south Gujarat.

At the state level while contribution of expansion of sown area to output growth was on the wane, rising intensity of cultivation was a more important factor contributing to output up to 1991-93. In the decade of the 90s and early 2000s, the cropping intensity too has taken a beating that is bound to adversely affect the overall production.

Gujarat's agriculture besides being weather dependent, is small scale on account of pressure of population and inadequate growth of off-farm employment opportunities. During 1990-91 the average size of operational farm holding was 2.93 hectares. Agricultural Census of 1995-96 revealed the average size to have reduced still yet to be 2.62 hectares. Over time the share of small and marginal holdings has increased to 55 %. In 1995-96, 44 percent of the farmers held land between 2 to 10 hectares and operated nearly 79 percent of the total land under the plough.

IV. Cropping Pattern

The area shares for major crops/crop groups for the pre-globalized era (i.e. up to early 1990s) and post globalization period (TE 2003) are depicted in Table 1. Area under cereals declined continuously in the three sub periods of the first phase from 42.5 percent to 29.8 percent. Decline was the sharpest in the last decade, and can be attributed to the fall in area under coarse cereals. Area under total foodgrains remained stagnant from 1963 to 1983 but declined dramatically in the subsequent decade reaching 38 percent of the cropped area. This happened despite the increase in area under pulses. In the same time area under oilseeds moved from 23.5 to 27.5 percent. Irrigated cultivation of mustard had gained importance. Groundnut on the other hand has been losing importance, its share falling steadily from 21 to 18 percent and is probably being replaced by other *rabi* oilseeds such as castor. Share of cotton in GCA has also declined. Share of sugarcane although quite marginal, has increased steadily from 0.2 percent in 1963 to 1.2 percent in 1993. This is an outcome of spread of canal irrigated area.

[2] Of the three years constituting triennium 2003, landuse statistics for the year 2002-03 are not yet obtained from government sources. Agricultural season 2000-01 faced scarcity conditions. The rainfall was deficient to the extent of 38 percent of the normal. Most of the districts received normal rainfall during monsoon of 2001. The year 2002-03 again being normal from viewpoint of monsoons, the extent of gross cropped area (GCA) is taken to be the same as preceding year and triennium ending average build.

Table 1: Cropping Pattern Changes for State

(Area share as % to GCA)

Crop/Crop Group	TE 1963	TE 1973	TE 1983	TE 1993	TE 2003
Rice	5.47	4.78	5.6	5.54	5.41
Wheat	4.03	4.75	6.08	4.72	3.72
Jowar	13.27	9.29	9.97	4.29	1.56
Bajra	14.21	13.09	13.55	11.38	8.94
Maize	2.75	2.49	3.41	3.38	4.02
Total Cereals	42.55	45.18	41.23	29.79	23.98
Tur	0.9	0.95	3.12	3.85	3.00
Total Pulses	5.14	4.67	9.28	8.38	6.43
Total Foodgrains	47.69	49.85	49.55	38.17	30.41
Groundnut	21.31	18.65	19.84	18.41	17.65
Mustard	0.14	0.57	1.88	3.42	1.85
Total Oilseeds	23.55	21.28	25.19	27.46	26.01
Sugarcane	0.22	0.48	1.07	1.18	1.73
Cotton	17.12	20.96	13.08	10.68	15.59
Other Crops	11.42	7.43	11.11	22.51	26.26
GCA (ha)	9982357	10085200	10838800	10646550	10693000

Source: Season & Crop reports, Deptt of Agri., Govt of Gujarat

In the post globalisation decade, some of the trends have persisted and the fall in foodgrains area continued relentlessly, be it rice, wheat or coarse cereals or even pulses area. Groundnut area too declined along with mustard. The latter had peaked in early '90s. Overall oilseeds area fell marginally in the '90s. Sugarcane on the other hand gained ground together with cotton, both water intensive crops. Vegetables, fruits, banana, potato, spices & condiments, fodder crops, medicinal crops are some crops that have taken remarkable strides in the post-liberalisation period and their combined share stood at 26.3 percent in early 2000s. Commercialization of agriculture has deepened further in the state in the period after 1993.

While cotton area gained in the '90s, its output suffered. Technological developments in the '70s and '80s lead to greater yields. However yield of cotton has registered remarkable decline in the '90s period. During the sixties with increase in area under foodgrains and sugarcane the share under other crops declined from 11.4 to 7.4 percent. Thereafter, their share increased quite steadily. The gain had been particularly dramatic in the '70s decade. In the eighties the share of such non-traditional non food crops including fruits/vegetables recorded incredible increase to 22.5 percent of the gross cropped area. While the gains have not been as dramatic as in the preceding period, nonetheless these crops have consolidated their share in the agricultural economy of the state in the post liberalization phase. It needs to be emphasized that these crops are amenable to processing and value addition. Efforts are needed for rapid expansion of post-harvest, storage, marketing and processing facilities for their value addition, which can pay the cultivators richly, besides creating possibilities for off farm employment and income generation.

In respect of this category of crops, the leading districts in terms of area share and growth in 2001-03 over 1991-93 are Ahmedabad & Gandhinagar, Kutch, Mehsana, Surat, Vadodara. Districts like Banaskantha, Kheda, which had a large and rising share till '90s have recorded losses in area on the other hand. Newer grounds are being opened in Amreli, Panchmahals, Sabarkantha, which are recording substantially higher shares.

V. Growth of Output

Table 2: Districtwise Levels and Growth of Output for Major Crops

(At 1990-93 Constant Prices)

District	Value of Output (in Rs.million)					Percent Annual Compound Growth Rate			
	TE 63	*TE 73*	*TE 83*	*TE 93*	*TE 03*	*73 over 63*	*83 over 73*	*93 over 83*	*03 over 93*
A'bad , G'Ngr	1767.23	2211.27	1886.64	2088.41	1612.29	2.27	-1.58	1.02	-2.55
Amreli	1612.24	1947.83	4300.52	2324.02	2751.18	1.91	8.24	-5.97	1.70
Banaskantha	723.85	1554.90	2580.29	2088.53	2424.23	7.95	5.20	-2.09	1.50
Bharuch	1668.38	1358.78	1467.28	1630.30	1634.25	-2.03	0.77	1.06	0.02
Bhavnagar	1548.44	1831.21	4830.10	3019.62	2751.82	1.69	10.18	-4.59	-0.92
Jamnagar	1451.28	2095.56	3191.86	1472.48	2097.94	3.74	4.30	-7.44	3.60
Junagadh	2810.59	3861.69	4776.99	3440.68	5337.50	3.23	2.15	-3.23	4.49
Kutch	590.29	1088.44	1426.25	1641.27	1539.17	6.31	2.74	1.41	-0.64
Kheda	1535.47	1772.81	2530.70	2241.30	1926.94	1.45	3.62	-1.21	-1.50
Mehsana	1473.09	2767.26	3805.36	3150.14	2216.60	6.51	3.24	-1.87	-3.45
Panchmahals	1499.00	1550.86	1690.53	1640.36	1240.12	0.34	0.87	-0.30	-2.76
Rajkot	2311.83	2649.37	3664.00	2742.94	2426.00	1.37	3.30	-2.85	-1.22
Sabarkantha	1835.88	2063.47	2296.71	1826.11	1369.57	1.18	1.08	-2.27	-2.84
Surat	1586.38	1193.73	1591.46	1824.07	1597.74	-2.80	2.92	1.37	-1.32
Surendranagar	1331.24	1712.43	2256.36	2407.32	1982.79	2.55	2.80	0.65	-1.92
The Dangs	42.85	42.19	64.29	68.76	109.84	-0.16	4.30	0.67	4.80
Vadodara	1586.21	2000.77	2830.69	2626.43	2020.56	2.35	3.53	-0.75	-2.59
Valsad	679.08	665.94	1093.04	1120.73	954.68	-0.20	5.08	0.25	-1.59
Gujarat	26053.33	32368.51	46283.07	37354.33	35985.91	2.19	3.64	-2.12	-0.37

	83 over 63	*93 over 63*	*03 over 63*
	2.91	1.21	0.81

Note : Crops considered are rice, wheat, jowar, bajra, maize, tur, groundnut, mustard, sugarcane and cotton

Source : Season & Crop Reports for various years, Deptt of Agri. Govt of Gujarat;

Bhalla & Singh, 2001, "Indian Agriculture –Four Decades of Development"

Output growth is a function of increases in yield, area and changes in cropping patterns. Contribution of each of these components in the agricultural growth of the districts has been being assessed. The effect of growth in male agricultural workers and other inputs on output and yield is being estimated and some preliminary findings are reported later.

Table 2 depicts the level and growth of aggregate output at district level for the major crops. The crops considered in the analysis are rice, wheat, *jowar, bajra*, maize and *tur* as the primary foodcrops; groundnut and mustard as the main oilseeds. Among the cash crops, sugarcane and cotton are used in the computations. Due to the exclusion of other important crops such as tobacco, other oilseeds such as, castor, spices, vegetables, horticultural crops etc., the output and growth rates may to some extent be understated. The agricultural year 2000-01 was a scarcity year and may also have distorted the averages for the period TE 2003. For the selected crops, the triennium ending average of output has been calculated using the all India prices for triennium ending 1993. Growth rates are the compound annual growth rates.

For the entire duration of the study period, Gujarat's agriculture grew at 0.81 percent. The highest output growth was recorded in Banaskantha, Kutch and Dangs districts (at rates between 2.38 to 3.1 percent). In the first two districts this was largely on account of switchover to non food crops, in Dangs the growth rate has been consistently high staring from a low level of output. Growth rate of output was medium in Bhavnagar, Junagadh, Mehsana (between 1.03 to 1.62 percent) .

During the sub phases, several changes took place in the districts in the pattern of agricultural development. During the initial phase, that is between 1961-63 to 1971-73, high performance districts were Banaskantha, Kutch, Mehsana, Junagadh and Jamnagar. These districts had very low output to begin with on account of bad rainfall and poor irrigation development. By the seventies the output all but doubled in these with noteworthy progress in irrigation development. In most districts growth was led by appreciable gains in irrigation development.

The second phase from 1971-73 to 1981-83 was characterized by faster agricultural output growth in the state, the rate accelerating to 3.6 percent. Districts that consolidated their position were Amreli, Bhavnagar, Kheda, Dangs, Vadodara and Valsad. On account of technological developments in agriculture these medium growth districts of the first phase became high growth areas in the subsequent period. In absolute terms the output during 1981-83 over that during 1971-73 recorded an increase of Rs. 13914.5 million, more than double the increase recorded during the earlier period.

The growth of agricultural output for the crops selected in the period 1981-83 to 1991-93 marked a turn around and is reflected in the deceleration of output growth At the state level, the growth of output decelerated to reach -2.12 percent from +3.64 percent recorded in the previous phase. Negative growth was recorded in all the districts which had improved production in the second phase vis-à-vis the first phase. Most notably output growth became negative in districts of Amreli, Bhavnagar, Jamnagar, Rajkot, Vadodara and also in Kheda.

It emerges that after the eighties crop output has stagnated or decelerated. Shift in the cropping pattern was taking place. Output growth had been largest for a few districts in Saurashtra, Kutch, Amreli, Banaskantha. In Kutch possibly in the limited cropped area, efforts were being made to maintain the output levels. In the remaining districts resource stress became serious. Overdrawal of ground water in the districts of North Gujarat and Saurashtra is a problem that demands urgent attention.

The decline in the output growth continued during the post liberalization phase too, though the rate decelerated to -0.37 %. Viewed with the base ('63) in mind, the output growth has been the slowest at 0.81 percent per annum. Remarkable growth in output could be witnessed in Jamnagar, Junagadh (may be due to accelerated output increase from groundnut , increased area share under cotton and other crops of commercial value.) A positive trend was also maintained in Dangs, where output from cotton and groundnut has risen by leaps and bounds in the recent decade. The remaining districts have fared quite poorly. Thus in the '90s period while output from major crops in the state continued to decline, the pace had slowed down vis-à-vis the '80s. The '70s decade was a sort of watershed as far as output from agriculture is considered. Output declined continuously thereafter.

VI. Land Productivity

Growth of yield is an important component of growth in value output. Before the advent of the new seed -fertilizer technology, the major source of output growth was area expansion. However, in subsequent decades the significant increases in yield levels of cereals and other crops, became the major contributor to output growth.

Table 3: Yield Level for Major Crops

(Kgs/Ha.)

Crop/ Crop Group	TE 1963	TE 1973	TE 1983	TE 1993	TE 2003
Rice	873	918	1335	1332	1207
Wheat	902	1651	2316	2119	2223
Jowar	298	377	566	597	733
Bajra	435	744	1194	891	1047
Maize	1062	1222	1397	1193	1485
Tur	497	696	719	780	510
Groundnut	611	605	817	586	778
Mustard	520	938	1399	1052	1163
Sugarcane	5461	5215	7422	8337	7056
Cotton	136	163	205	239	154

Source: Department of Agriculture, Govt of Gujarat

The changes taking place in the output in physical terms for the major crops are depicted in Table 3. Yield of crops per hectare is a direct reflection of the technical inputs added to the land resource. Nearly all the foodgrains witnessed remarkable strides in yield enhancement at least until the early eighties. Thereafter output in physical terms started to either stagnate or decline. Yield of rice at state level had been increasing progressively from the early sixties till the eighties. No major breakthrough in rice yield was observed in the subsequent decade, in the 90s in fact the average yield declined considerably. Similarly in case of wheat, yield increase till the early eighties was remarkable- by nearly 157 percent (from 902 to 2316 kg/ha). In the early nineties however, a small decline was observed in yield of wheat and in the 90s yields of wheat have not regained the peak achieved in the early 80s. In case of coarse cereals though from the sixties through the early 2000s, appreciable yield gain was attained for *bajra* and *jowar* . Yield of maize, on the other hand, has remained largely constant over all the decades. Amongst

pulses, yield per ha of tur recorded a steady increase till early 90s, thereafter fell to the pre-green revolution levels.

Mustard yield has more than doubled from 520 to 1163 kg/ha between TE 1963 to 2003. Groundnut yield is highly fluctuating. Amongst the other cash crops, sugarcane yield has increased steadily though some deceleration was observed in the last decade. Over use of irrigation may be taking its toll as far as sugarcane yields are concerned. Cotton yield nearly doubled upto early 90s, but by early part of the current decade the yield of cotton had declined substantially. Thus the yields of important cash crops like rice, tur, sugarcane, cotton have suffered greatly in the 90s phase. There is a need to ascertain the causal factors for this observable decline in the yields of these important irrigated crops.

Table 4 depicts the levels and changes that have taken place in the levels of aggregate land productivity.

Table 4 : Districtwise Land Productivity of Major Crops

	Land Productivity (Rs./Ha)					Growth Rate (% Per Annum)			
District	TE 63	TE 73	TE 83	TE 93	TE 03	*73 over 63*	*83 over 73*	*93 over 83*	*03 over 93*
A'bad & G'Ngr	3035.92	3689.74	3592.69	4484.14	4071.09	1.97	-0.27	2.24	-0.96
Amreli	3705.50	4117.74	8319.81	4987.18	6395.11	1.06	7.29	-4.99	2.52
Banaskantha	1411.38	2532.55	4433.24	4132.17	4941.69	6.02	5.76	-0.70	1.81
Bharuch	4623.43	3479.60	4105.44	5128.34	4764.11	-2.80	1.67	2.25	-0.73
Bhavnagar	2849.68	3261.08	7362.95	5890.02	5587.83	1.36	8.48	-2.21	-0.53
Jamnagar	2846.69	3539.31	5017.20	3055.57	4169.48	2.20	3.55	-4.84	3.16
Junagadh	5275.99	6746.88	7500.75	6442.41	9863.55	2.49	1.06	-1.51	4.35
Kutch	1636.67	2720.88	4217.38	6537.65	7030.31	5.21	4.48	4.48	0.73
Kheda	4400.21	4201.98	5257.68	6317.67	5709.46	-0.46	2.27	1.85	-1.01
Mehsana	2742.54	4105.53	5988.92	6668.35	6156.09	4.12	3.85	1.08	-0.80
Panchmahals	3454.35	3824.88	4084.40	4053.93	3495.91	1.02	0.66	-0.07	-1.47
Rajkot	3231.58	3634.91	4852.56	4214.94	3784.90	1.18	2.93	-1.40	-1.07
Sabarkantha	4340.56	4698.24	5780.30	5526.98	4563.22	0.79	2.09	-0.45	-1.90
Surat	4242.49	3659.88	5125.48	6176.32	5499.98	-1.47	3.43	1.88	-1.15
Surendranagar	2120.80	2616.26	3747.48	4959.46	3839.89	2.12	3.66	2.84	-2.53
The Dangs	4501.05	4305.10	5335.27	4225.66	4458.86	-0.44	2.17	-2.30	0.54
Vadodara	3638.71	4508.27	6868.36	5698.48	4976.76	2.17	4.30	-1.85	-1.35
Valsad	5134.82	4894.21	7428.87	7892.46	6599.19	-0.48	4.26	0.61	-1.77
Gujarat	3308.28	3833.93	5499.64	5226.00	5300.98	1.49	3.67	-0.51	0.14
							83 over 63	*93 over 63*	*03 over 63*
CV	32.16	24.94	26.33	22.61	28.77		2.57	1.54	1.19

Source : Season & Crop Reports for various years, Deptt of Agri. Govt of Gujarat;
Bhalla & Singh, 2001." Indian Agriculture --Four Decades of Development"

Land productivity in the analysis constitutes the value of output of the major crops, viz., rice, wheat, *jowar, bajra*, maize, *tur*, groundnut, mustard, sugarcane and cotton divided by the cropped area under these crops. Over the four decades in Gujarat, while the value of output increased at 0.81 percent per annum, value of yield per hectare registered growth rate of nearly

1.2 percent per annum. This accounted for the entire growth of output, as area expansion recorded a negative growth at - 0.3 percent per annum. Highest increase was registered in Junagadh, Jamnagar, Amreli followed by Banaskantha, at rates varying between 1.81 to 4.35 percent per annum. In all the remaining districts land productivity either stagnated or declined remarkably over the years.

In the pre-green revolution phase productivity of land for major crops increased at 1.5 percent per annum. High growth of yield was observed in Banaskantha, Kutch, Mehsana significantly raising their output levels. In the '70s the effects of green revolution were quite evident and increased the growth rate of land productivity substantially at 3.7 per percent annum. By 1981-83 with the increased use of inputs and irrigation expansion, nearly all districts recorded notable increases in crop productivity. The growth rate of productivity was quite high in Bhavnagar, Amreli and Banaskantha. The increase in land productivity was much higher (2.6 %) in the entire period from 1963-83 than the earlier period.

During 1981-83 to 1991-93, commensurate with the output performance, the performance of productivity was also dismal. The rate of land productivity growth decelerated to -0.51 percent from 3.7 percent annual increase registered in the preceding period. Predictably the yield levels in all these districts became considerably lower than the previous period. The decline experienced in this decade brought down the long term growth rates in yield to 1.5 percent per annum.

Evidently productivity gains after the eighties become unimportant. However mention may be made of the fact that the year 1991-92 included in computing the triennium average for 1991-93 was a particularly bad year for Gujarat's agriculture. Moreover labour productivity fall after all may not be as alarming as it appears when we consider that the labour is also engaged in "other crops", that constituted nearly 22 percent of the GCA during 1991-93. Possibly more and more productive area was started to being diverted to such crops, which may be the answer to the falling productivity levels of the selected crops. We also cannot ignore the possibility that modern inputs were being increasingly diverted to consolidate the output of the "other crops", which have not been considered in our analysis. Nevertheless, the fact remains that nearly all the districts, as far as major crops are concerned, had attained stagnancy in agriculture up to the early '80s.

The scenario during the immediate past ('90s) appears to be not so dismal. In the period after liberalization the growth rate of land productivity has turned positive albeit marginally to 0.14 percent per annum. While many districts continue to register either a fall in growth or stagnate some promise was visible in Junagadh, Jamnagar, Amreli at rates varying between 2.5 to 4.4 percent per annum, which have lead to enhanced output levels here. For the state in the post liberalization phase, the marginal increase in land productivity with regard to the major crops could not arrest the overall decline in output levels. Needless to add, as in the previous decade even in the '90s area under "other crops" has got consolidated further. To that extent, this is an indicator of the increased commercialized nature of the state's agriculture. Output increase from the major foodgrains and traditional cash crops that still occupy 74 percent of the GCA would have to be through major technological breakthroughs, otherwise agriculture would continue to absorb labour at falling productivity levels.

VII. Input Use

District wise details on area irrigated, number of tractors and pump sets and consumption of fertilizers are given in Table 5. Yields and growth of crop output are positively associated with use of modern inputs. The available evidence supported this presumption atleast in the '80s decade. By 1991-93, the high productivity districts of Valsad, Mehsana, Kheda, Surat, Sabarkantha, were characterised by high levels of area under irrigation. In Valsad and Surat, high rainfall may have been an additional causal factor. In most of the districts listed the consumption of fertilizers was also of the highest order. In Surat it was 173 kg/ha, followed by Kheda (132 kg/ha), Sabarkantha (99 kg/ha), Valsad (90 kg/ha) and Junagadh (71 kg/ha).

At the state level too, there was a strong relationship between use of modern inputs and the magnitude of crop output. Between early '60s and '80s, the output nearly doubled. While area increase was not much remarkable, the effects of increased input use were evident through the doubling of the land productivity. During this period, the per hectare consumption of fertilizers rose from 4 to 40 kg/ha. Substantial gains were also made in the use of pump sets, from 13.5 to 59 per thousand hectares. Percentage of GCA under irrigation increased from 7.8 percent to 22.7 percent. Consequently the growth of output between 1971-73 to 1981-83 accelerated at 3.6 percent. Input use continued to increase during the next decade too. By early nineties, the change in irrigated area was by five percentage points, commensurate rise in use of pumpsets was to 73 per thousand hectares. There was remarkable increase in case of fertilizer use. Its consumption rose from 39 to 66 kg/ha. Between 1981-83 to 1991-93, in the districts of Bharuch, Surat and Kutch, output growth was high. Growth in the consumption of fertilizers too was quite large here, the jump being quite substantial from the consumption levels in 1981-83 in these districts. The recent input data from the livestock census (2003) indicate that use of pumpsets and tractors have continued to rise quite substantially. There were nearly 99 pumpsets and more than 15 tractors in operation per '000 hectares. Fertilizer use has reached unprecedented height of 107 kgs/ha, even though irrigated area has continued to grow at a much slower pace (reaching only 33 percent in TE 2003).

Presently, positive relation between enhanced input consumption and output growth exists only in Banaskantha, Junagadh, Jamnagar, Kutch, Amreli and to some extent in Dangs. In the remaining districts higher input use has not lead to a commensurate positive effect on productivity of land or total crop output in the post-liberalisation phase. In most of the districts of Gujarat there is a dichotomy between rising cost of cultivation and output from land and that to the cultivators. Such a trend has been exacerbated in the '90s decade.

Table 5:Districtwise Level of Input Used

District	No. of Tractors (per 000 ha)				No. of Pumpsets (per 000 ha)				Consumption of Ferti. (Kgs/ha)				% of GCA Irrigated				Cropping Intensity			
	1963	1983	1987	2003	1963	1983	1987	2003	1963	1983	1993	2004	1963	1983	1993	2003	1963	1983	1993	2003
A'bad ,G'Ngr	0.47	3.82	7.20	20.57	8.60	26.35	31.11	37.27	1.42	26.42	69.98	79.20	9.28	19.16	28.82	40.37	1.00	1.04	1.08	1.11
Amreli	0.55	3.56	4.66	12.67	17.40	93.79	112.45	104.67	4.35	56.67	51.86	82.60	6.32	13.89	10.84	16.87	1.01	1.13	1.05	1.02
Banaskantha	0.05	1.84	4.23	20.26	4.53	45.09	74.07	95.18	0.51	13.19	42.10	78.20	7.81	22.76	33.00	46.62	1.08	1.19	1.30	1.40
Bharuch	0.43	1.37	3.42	11.17	3.79	10.37	15.39	35.05	3.34	18.91	50.12	109.60	2.75	10.28	13.08	24.55	1.00	1.01	1.01	1.01
Bhavnagar	0.17	2.18	3.61	16.68	14.21	84.99	104.53	173.53	3.46	44.07	61.60	98.80	8.32	21.22	23.37	26.87	1.02	1.17	1.11	1.04
Jamnagar	0.17	1.64	1.97	9.96	23.69	100.93	113.23	153.95	1.86	36.20	30.91	76.00	5.40	23.97	22.91	12.79	1.03	1.22	1.10	1.04
Junagadh	0.24	2.49	4.12	17.21	38.55	145.62	185.26	204.98	6.18	63.03	71.39	112.90	14.28	20.45	17.91	22.11	1.06	1.17	1.12	1.12
Kutch	0.12	1.43	3.19	11.14	8.03	23.13	30.50	27.97	10.26	5.89	25.30	65.20	6.94	10.67	15.58	27.94	1.02	1.05	1.08	1.05
Kheda	1.07	7.60	12.23	25.16	10.94	28.11	43.73	57.57	10.15	66.62	131.74	206.50	9.41	46.25	52.77	60.18	1.06	1.18	1.21	1.19
Mehsana	0.36	5.09	6.95	15.07	18.89	35.38	19.38	91.43	1.34	33.50	59.89	88.90	19.29	40.38	49.97	45.64	1.07	1.32	1.29	1.23
Panchmahals	0.06	0.47	1.23	7.50	2.74	24.99	67.52	130.34	0.77	15.21	47.26	134.10	2.22	9.82	14.33	10.03	1.21	1.12	1.17	1.05
Rajkot	0.36	2.76	3.36	12.54	23.07	118.10	134.69	116.38	4.30	70.36	66.35	132.30	6.51	22.61	25.43	25.46	1.01	1.13	1.10	1.02
Sabarkantha	0.31	3.84	6.55	22.90	19.78	109.21	120.48	182.40	0.77	71.48	99.32	130.90	11.21	34.29	30.53	35.85	1.10	1.12	1.17	1.17
Surat	1.13	5.49	8.32	16.86	6.96	24.00	38.56	82.26	4.84	87.41	173.29	297.20	6.44	29.57	38.69	53.17	1.05	1.07	1.08	1.14
Surendranagar	0.21	2.08	3.11	17.89	6.26	44.59	39.95	50.78	0.16	12.42	33.02	79.40	4.04	13.06	16.91	18.47	1.01	1.02	1.04	0.99
The Dangs	1.00	0.07	0.04	1.32	0.37	0.81	2.06	17.16	0.00	0.81	0.34	0.34	0.10	0.22	0.18	0.87	1.00	1.00	1.00	1.02
Vadodara	0.47	2.14	3.36	8.93	5.61	17.91	24.89	51.95	7.88	49.42	82.22	156.80	3.86	23.21	27.52	41.62	1.03	1.04	1.04	1.08
Valsad	0.60	3.90	8.08	14.83	12.55	40.95	71.55	104.21	3.66	33.72	90.34	225.90	4.41	17.84	29.55	50.06	1.11	1.10	1.10	0.96
Gujarat	0.38	2.93	4.81	15.39	13.55	58.74	73.17	98.82	3.64	39.55	66.17	106.80	7.85	22.76	27.30	32.69	1.05	1.13	1.13	1.11

Source: Bhalla & Singh, 2001; Fertilizer Statistics for Different Years;
Livestock Census, 2003; CMIE, Ahmedabad; Directorate of Agriculture, Gandhinagar

Table 6 : Determinants of Per Hectare Productivity
Regression Results : Districts of Gujarat
Model : log(Prod) = a + b1 log(x1) + b2 log(x2) + ... (Stepwise Regression)

Step	R-bar Square	Constant term	Fertilizer		Cropping Intensity		Male Agri. Workers		Irrigation		Pumpsets		Tractors	
60s														
1	0.40	3.67											**0.28**	*
													(3.40)	
2	0.60	3.80					**0.39**	*					**0.22**	*
							(2.92)						(3.05)	
3	0.66	3.65					**0.47**	*			**0.15**	***	**0.17**	**
							(3.61)				(1.88)		(2.45)	
4	0.78	3.73					**0.47**	*	**-0.30**	**	**0.31**	*	**0.17**	*
							(4.57)		-(2.86)		(3.65)		(3.07)	
80s														
1	0.09	3.60	**0.09**											
			(1.68)											
2	0.26	3.59	**0.26**	**					**-0.20**	**				
			(2.79)						-(2.15)					
3	0.38	3.58	**0.27**	*	**1.59**	***			**-0.26**	**				
			(3.17)		(2.01)				-(2.91)					
4	0.39	3.68	**0.25**	**	**1.77**	**			**-0.36**	**			**0.12**	
			(2.76)		(2.18)				-(2.80)				(1.00)	
90s														
1	0.17	3.67											**0.09**	**
													(2.12)	
2	0.31	3.86							**-0.23**	***			**0.31**	**
									-(2.05)				(2.69)	
3	0.33	3.92							**-0.20**		**-0.07**		**0.31**	**
									-(1.64)		-(1.23)		(2.72)	
2000s														
1	0.02	3.61							**0.07**					
									(1.12)					
2	-0.014	3.62	**-0.07**						**0.17**					
			-(0.74)						(1.17)					

Significance of T at

* 1 percent level
** 5 percent level
*** 10 percent level

Table 6 gives the results of statistical exploration about determinants of land productivity across districts for the four points of time. It is seen that overall explanatory power of the model used declines with time. In the initial phase male agricultural worker productivity, pump sets and rudiments of mechanization were crucial in determining land productivity. Fertilizer consumption emerged as a crucial determining factor during the eighties. The early nineties were

marked by significant distortions in the fertilizer use pattern, arising from the introduction of policy changes and the resulting sudden rise in fertilizer prices. This may have led to fall in productivity levels in the state for most crops. Nonetheless, results are quite unsatisfactory for the nineties. May be there were excluded variables that are important. Also the fact that we are not taking into account "other crops", which are input intensive and had become quite important (22 percent of GCA), also affects the performance of estimated equation.

The exercise was attempted again for the early 2000s. The results indicate further deterioration in the explanatory power of the model in the post globalised era. Irrigation emerges to be the variable of some consequence, and as stated earlier productivity levels in the state do not respond to the input use patterns. However the caveat of non inclusion of "other crops" in the estimated equation remains, together with the possibility of excluded independent variables[3]. The fact remains that irrigation expansion has not witnessed remarkable changes. Most of the increase in irrigation capacity has happened due to harnessing of ground water resources. Over exploitation of ground water in the state is proving to be sub-optimal. The adverse effects on productivity levels of negative externalities associated with overdrawl of groundwater are becoming visible. Notable increase in fertilizer use has been observed in the last decade together with mechanization of farm operations. Emergence of ground water and machine markets are a far greater reflection of private benefits rather than macro level changes in agricultural productivity. Rising cost of agriculture has been noticed for India since long. In Gujarat perhaps the net effect may be more than in other states due to the commercial nature of farming. Commercial orientation is manifested in greater interface with the markets for purchase of inputs and output disposal in the state.

Authors have commented upon the phenomenon of increased cost of production among the major economic sectors. VKRV Rao (Rao, 1983 as cited in Nadkarni, 1988) reported a decline in input-output ratio in agriculture by 22.5 percent between 1961 to 1980. Nadkarni (1988) by observing the behaviour of input-output ratios for seven major sectors between 1970-71 to 1984-85 also reported the fastest decline in the case of agriculture and allied sectors. The average rate of decline worked out at 0.05 percent per year earlier became 0.07 percent per year between 1971 to 1985. During this period the rate of growth in inputs per hectare was more than double that of output. The worsening of the input-output ratio got exacerbated during the period of technological breakthrough when unprecedented expansion under HYV area and "industrial inputs" were witnessed. In case of Indian agriculture, new technology brought about increase in productivity levels. However in a number of cases it showed a strong and negative correlation between productivity and net returns. Efforts have been made to reduce the cost for the farmer through huge subsidies on inputs. The real social cost of production thus is higher than what is obtained by way of private costs to the farmers.

What is true for India is also being observed at the state level. Studies for Gujarat indicate that the overall per quintal real cost of cultivation of non-food crops has increased in the state (Patel, 2001). Analysis in preceding sections has indicated that overall productivity in respect of major crops is deteriorating, while on the other hand there is evidence of increase in cost of cultivation

[3] Inclusion of rainfall variations and percentage of non traditional non food crops, for instance, as other independent variables may improve the goodness of fit aspect of the estimated equation. See Shah (1993) for results of a more comprehensive econometric exercise.

seen through tremendous rise in use of monetized inputs. This paradox of increased inputs is quite visible in Gujarat agriculture of present, and challenges its sustainability. Increased costs are accompanied by diminishing returns to technical inputs, declining growth rates and increased instability of agriculture. Additionally the distributional impact of increased monetization of inputs and commercialized agriculture "cannot but be adverse". Farmers are made more vulnerable to markets forces and market risks, particularly as marketing efficiency has not developed equally well for all crops (Nadkarni, 1996).

VIII. Labour Productivity

The absorption of labour in agriculture is affected by factors such as output growth, increases in cropping intensity, crop composition, besides changes in the production process. In addition to this degree of mechanization, size of holdings, wage levels also play a crucial role in determining the labour absorption. Farm sector also serves as the parking place of the poor. It is therefore important to ascertain the variations at district level in the pattern of growth of agricultural workers productivity, particularly of the male workforce. The agriculture worker productivity in the study is based on the output of selected crops at 1990-93 prices (Table 7). Agricultural workers comprise cultivators and agricultural labourers, and in our analysis labour productivity of only male agricultural workers has been considered.

Table 7 : Districtwise Level and Growth of Male Agricultural Workers Productivity

(Rs Per Worker at 1990-93 prices)

	Male Workers Productivity					Growth Rate (Percent Per Annum)			
District	1961-63	1971-73	1981-83	1991-93	2001-03	*73 over 63*	*83 over 73*	*93 over 83*	*03 over 93*
A'bad , G'Ngr	9233	9620	7539	7229	4156	0.41	-2.41	-0.42	-5.39
Amreli	11956	12044	22275	12010	13484	0.07	6.34	-5.99	1.16
Banaskantha	3049	5432	7407	4917	5341	5.94	3.15	-4.01	0.83
Bharuch	8403	6013	5917	5876	5381	-3.29	-0.16	-0.07	-0.88
Bhavnagar	8711	8456	17334	17259	11961	-0.30	7.44	-0.04	-3.60
Jamnagar	11282	12604	16265	7095	10202	1.11	2.58	-7.96	3.70
Junagadh	12695	13775	14415	8916	12206	0.82	0.46	-4.69	3.19
Kutch	5776	8304	9918	10486	5916	3.70	1.79	0.56	-5.56
Kheda	3772	3712	4569	3574	2815	-0.16	2.10	-2.43	-2.36
Mehsana	4780	7305	8961	6647	4766	4.33	2.06	-2.94	-3.27
Panchmahals	3901	3469	3206	2645	1688	-1.17	-0.79	-1.90	-4.39
Rajkot	12872	11786	13606	9566	9721	-0.88	1.45	-3.46	0.16
Sabarkantha	9019	8667	8054	5569	3650	-0.40	-0.73	-3.62	-4.14
Surat	7476	4461	4972	5093	4017	-5.03	1.09	0.24	-2.35
Surendranagar	11862	11946	13896	13160	8703	0.07	1.52	-0.54	-4.05
The Dangs	2208	1807	2484	2154	2775	-1.98	3.23	-1.41	2.56
Vadodara	5272	5740	6913	5820	4239	0.85	1.88	-1.71	-3.12
Valsad	3149	2867	4164	3401	2845	-0.93	3.80	-2.00	-1.77
Gujarat	6975	7226	8849	6441	5796	0.35	2.05	-3.13	-1.05
							83 over 63	*93 over 63*	*03 over 63*
CV	48.42	48.44	58.09	54.49	58.69		1.20	-0.27	-0.46

Source: Census of India, 1961 to 2001; Table 2

Between 1961-63 and 1971-73, the growth rate of agricultural output in the state at 2.19 percent, exceeded that of male agricultural workers of 1.83 percent per annum. Hence, the male worker productivity increased though slowly at annual rate of 0.4 percent. During this period districts having high growth of output, were associated with high growth of male agriculture workers too.

In the next decade of 1971-73 to 1981-83, marked by technological breakthroughs, growth rate of output took rapid strides, increasing from 2.2 to 3.6 percent per annum. Additionally the growth rate of male agricultural workers in this phase decelerated to 1.56 percent per annum. At the state level, due to the slow down in involvement of male workers, worker productivity recorded an increase in the growth at 2.1 percent per annum. Among the districts, Amreli, Jamnagar, Surendranagar, Rajkot recorded medium to high growth and maintained their lead in workers productivity in the state. Amreli, Bhavnagar, Kheda, Dangs and Valsad recorded phenomenal growth ranging between 3.2 to 7.4 percent annually in male worker productivity as compared to very low or negative rates in the preceding period. This was primarily owing to large acceleration in the rate of output growth in these districts between 1971-73 to 1981-83.

The eighties departed significantly regarding growth of output. Output coming from the selected crops declined quite remarkably and the rate became -2.12 percent per annum between 1983-93. Despite a further deceleration in the engagement of male agricultural workers in the state between 1981 and 1991 to 1.04 percent per annum, the fall in output led to landslide decline in the workers productivity. In the '8os decade the worker productivity declined at -3.1 percent annually on an average. The worker productivity declined in nearly all the districts with Kutch being the only exception.

In the early 2000s decline in output continues but the rate has slowed down than that in the preceding decade. Male agricultural workers continue to grow, though their rate of increase slower at 0.7 % annually, worker productivity consequently also continues its fall. Its rate of decline at -1.05 percent is less than the '80s decade. However, the absolute level at Rs. 5796 per worker (at 1993 constant prices) is lower than even the levels ascertained before the advent of the green revolution in the early 1960s. With a few exceptions such as Amreli, Dangs, Banaskantha, Junagadh, Jamnagar that have recorded output increases, labour productivity is falling in all the remaining districts. The long term decline in the rate of productivity between 63 to 03 is at -0.46 %, even more than that experienced in TE '93 over the base (-0.27%). Our findings corroborate with what scholars have also stated (Bagchi, et.al, 2005):

"..agriculture remains the predominant sector in respect of labour absorption. A mismatch in the movement of income share and employment share is observed....this mismatch is stronger in the so called advanced economy of Gujarat...the employment elasticities of all sectors have declined steeply in the 1990s.....the agricultural sector has become the absorber of last resort. Given the low productivity and the income per capita of the population deriving their principal earnings from agriculture, the incidence of seasonal unemployment and overall under employment in that sector is likely to be pretty high also."

The CV of male agricultural worker productivity substantially increased between 1973 to 1983. Consequent to the deceleration in the productivity levels after eighties, the variability of worker productivity too declined from 58 to 54 percent, indicating thereby that regional disparities

existing earlier reduced. The co-efficient of variation in labour productivity has increased again in 2001-03 over 1991-93 from 54 to 59 percent, marking widening again in the regional disparities between high and low performing districts. The coefficient of variation of land productivity fell in the state from 32 to 23 percent between 1961-63 to 1991-93. Thus while agriculture was stagnating, disparities amongst the districts too declined as far as the land productivity was concerned. The variability of land productivity between TE '93 and '03 again rose from 23 to 29 percent thereby indicating a widening of the gap between districts and rising disparities. There was a declining trend in variability of land productivity, but the same was not true for labour productivity. The latter recorded increase after early '70s, thereby indicating that the period of stagnation was also marked by high variability.

Table 8 depicts across districts the decadal direction of change in land and labour productivity. During the first decade there were 11 districts that witnessed the rise in both land and labour productivity. The number rose to 15 in the next decade. There is complete reversal in the directional change in 1991-93 over 1981-83. Only two districts occupy ++ cell, whereas 13 districts show decrease in both land and labour productivity. In 2001-03 over 1991-93 a larger number of districts (5) occupy the ++ cell, while 11 districts occupy the cell marking declining land and labour productivity. The districts not experiencing increase in both land and labour productivity are different from the previous decade, indicating perhaps that the productivity levels are also affected by choice of crops cultivated and inter-districts variation in rainfall besides the irrigation development or input use. The table presents a telling evidence of stagnancy and decline of State's agriculture in the '80s and '90s.

That agriculture has stagnated finds reflection in the reducing share of agriculture in the state's net state domestic product (NSDP) from the eighties onwards. In the beginning of the eighties, share of agriculture - the most dominant sub sector, in the NSDP was 38.1 percent. By 1990-91 the share declined to 26.7 percent and further to 13.4 percent in 2000-01. However the rate of decline in NSDP from agriculture in the '90s decade was -0.3 percent per annum, slower than -1.6 percent per annum observed between 1980-81 to 1989-90. Clearly agriculture continues to stagnate in the post liberalisation era. However our limited evidence indicates that the satisfactory performance of a few districts, provide relief to what could have been a very dismal scenario in the '90s. This is an improvement over the conditions prevailing during the decade of '80s. Manufacturing and service sectors are without doubt becoming the mainstay in Gujarat's economy.

Table 8 : Direction of Growth in Land & Labour Productivity
71-73 over 61-63

Land Productivity	Labour Productivity: Decrease	Labour Productivity: Increase
Decrease	Bharuch, Kheda, Surat	
Increase	Bhavnagar, Panchmahals, Rajkot, Sabarkantha, The Dangs, Valsad	A'bad & G'Ngr, Amreli, Banaskantha, Jamnagar, Junagadh, Kutch, Mehsana, Surendranagar, Vadodara, **Gujarat**

81-83 over 71-73

Land Productivity	Labour Productivity: Decrease	Labour Productivity: Increase
Decrease	A'bad & G'Ngr	
Increase	Bharuch, Panchmahals, Sabarkantha	Amreli, Banaskantha, Bhavnagar, Jamnagar, Junagadh, Kutch, Kheda, Mehsana, Rajkot, Surat, Surendranagar, The Dangs, Vadodara, Valsad, **Gujarat**

91-93 over 81-83

Land Productivity	Labour Productivity: Decrease	Labour Productivity: Increase
Decrease	Amreli, Banaskantha, Bhavnagar, Jamnagar, Junagadh, Panchmahals, Rajkot, Sabarkantha, Surendranagar, The Dangs, Vadodara, **Gujarat**	
Increase	A'bad & G'Ngr, Bharuch, Kheda, Mehsana, Valsad	Kutch, Surat

01-03 over 91-93

Land Productivity	Labour Productivity: Decrease	Labour Productivity: Increase
Decrease	A'bad & G'Ngr, Bharuch, Bhavnagar, Kheda,Mehsana, Panchmahal, Sabarkantha, Surat, S'nagar, Vadodara, Valsad	Rajkot
Increase	Kutch, **Gujarat**	Amreli, Banaskantha, Jamnagar, Junagadh, Dangs

VI. Summing Up

The following inferences are emerging from analysis in the preceding sections:

- The district level analysis of levels and growth of agriculture output has brought out the changing nature of agriculture development in Gujarat in the post green revolution phase, and particularly during the eighties and post liberalisation phases. These developments have led to the spread of new technological inputs on a wider scale. During the seventies, the output in the state doubled compared to that recorded in the sixties. Districts having greater input use experienced faster growth of output. Thus during 1970-71 to 1981-83, crop output recorded unprecedented annual growth rate of 3.6 percent. Agricultural output peaked in the early 80s and started declining thereafter, the process continued in the '90s decade too, though at a slower pace.

- Analysis indicates to the fact that yield growth is the dominant source of output growth in the state and contribution of area to growth has declined in almost all the districts.

The eighties decade was marked by crop diversification towards non traditional non food crops. There has been a visible decline in the share of food crops and crop diversification away from coarse cereals towards oilseeds which are perhaps more remunerative. Increase in area under crops other than food crops and traditional non food crops of sugarcane, cotton and oilseeds started becoming important. In the post liberalisation phase, these crops have consolidated their position in the economy of Gujarat. This continues to be a positive trend and would create opportunities for weaning away excess labour from agriculture. Occupational diversification arising from interdependence between farm and non farm activities is crucial for employment generation and poverty alleviation.

The land productivity coming from the major crops continues to decline even in the '90s. Agriculture in the state has stagnated and the fruits of liberalisation have eluded the agriculture sector atleast till the beginning of the current decade. Perhaps increasingly productive and problem free lands continue to be allocated to "other crops". These crops also account for major portion of purchased inputs (fertilizers, water, tractors etc). Overall, monetization of inputs does not seem to be paying off significantly. Agriculture in the state, as in the rest of India, is marked by rising cost of cultivation with declining output to farmers.

The male agriculture worker productivity up to the early seventies registered a marked increase. Thereafter labour productivity too has declined substantially.

A challenge to the sustainability of agricultural growth arising out of the way soil, water, fertilizer are used is another disturbing factor of agriculture in Gujarat. Falling productivity levels indicate that agriculture requires technological and scientific inputs in order to come out of the prevalent stagnancy. Higher investments in irrigation, rural infrastructure, research and extension would have a beneficial impact on agricultural output and are important determinants of total factor productivity. These non price factors are important in inducing technical change in agriculture.

The violent fluctuations observed in Gujarat and the negative trend in the share of agriculture are to a large part induced by climatic and rainfall variations. The landscape is predominantly characterized by semi-arid conditions and frequent droughts. Erratic rainfall needs to be offset by irrigation for sustainable growth. However evidence is indicative of quite the opposite (Bagchi et.al, 2005). Falling share of government expenditure on agriculture enhances vulnerability to climatic fluctuations. Expenditure on irrigation and rural infrastructure would also lessen the brunt of high degree of unemployment and seasonal under-employment in rural areas, particularly for those workers who derive their principal earnings from the agriculture sector. The increasing share of male agricultural workers in main worker group, especially given the limited non-farm employment opportunities, points towards the need for giving agriculture a push towards more profitability. Adoption of sustainable technologies for resource management and evolving suitable cropping systems would hold centre stage in steering the state's farm sector to the desired growth path.

Increasing emphasis on agro-processing industries would further enhance the prospects of the horticultural, vegetable crops, rabi oilseeds, spices etc. More stress on research and extension and market support for the emerging crops is required. Adoption of region specific development approach is another requirement to strengthen the overall agricultural economy of the state.

References

Alagh, YK, RJ Mody and RD Desai (1993), *Sectoral Growth and Change*, SPIESR Monograph, Ahmedabad, Delhi, Har Anand Publications.

Bagchi, AM et.al (2005), Growth and Structural Changes in Economy of Gujarat, 1977-2000, *Economic & Political Weekly*, Vol 40, No. 28, July 9.

Bhalla, GS and YK Alagh (1979), *Performance of Indian Agriculture : A District wise Study*, New Delhi, Sterling Publisher.

Bhalla, GS and DS Tyagi (1989), *Patterns of Indian Agricultural Development - A District Level Study*, New Delhi, ISID.

Bhalla, GS and Gurmail Singh (2001), *Indian Agriculture- Four Decades of Development*, New Delhi, Sage Publications.

Hirway, I (1995), Selective Development & Widening Disparities in Gujarat, *Economic & Political Weekly*, Vol 30, Nos 41 & 42.

Joshi, SN (1996), Cropping Pattern Changes in Gujarat, *Anvesak*, Vol.26, No. 2, July-December.

Mathur, N & SP Kashyap (2000), Agriculture in Gujarat: Problems & Prospects, *Economic & Political Weekly*, Vol 35, Nos 35,36

Nadkarni, MV (1988), Crisis of Increasing Costs in Agriculture- Is there a Way Out?, *Economic & Political Weekly*, Review of Agriculture, September 24.

Nadkarni, MV (1996) Accelerating Commercialisation of Agriculture-Dynamic Agriculture & Stagnating Peasants?, *Economic & Political Weekly*, June 29.

Patel, AS (2001), Agricultural Development in Gujarat- Performance and Future Strategy, *Anvesak*, Conference Volume, Vol 31, No 1 & 2, Jan-Dec.

Rao, VKRV (1983), *India's National Income, 1950-80*, New Delhi, Sage Publications.

Shah, NC (1993), Land Productivity Differentials in Indian Agriculture : A District Level Analysis , in Alagh et.al (Ed.) (1993).

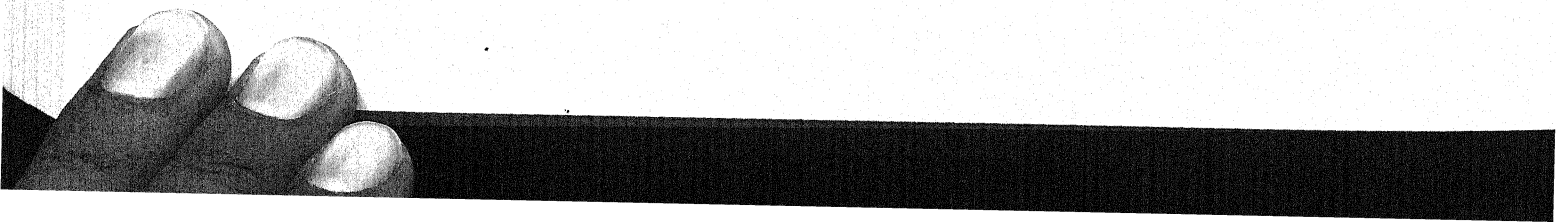
Annex 1: Cropping Pattern Changes - Districtwise

(% Share of Area to GCA)

District/ Period	Rice	Wheat	Coarse Cereals	Pulses	Foodgrains	Oilseeds	Sugarcane	Cotton	Other Crops
A'bad & G'ngr (part)									
1961-63	5.33	14.07	24.21	1.45	46.39	10.45	0.02	36.74	6.40
1981-83	10.04	16.22	23.75	21.89	56.08	4.70	0.26	27.22	11.74
1991-93	10.81	13.66	18.45	4.92	48.37	9.11	0.13	26.53	15.86
2001-03	10.53	10.42	7.74	2.74	31.42	5.37	0.08	23.71	39.42
Amreli									
1961-63	0.46	1.97	33.69	0.88	37.27	51.36	0.84	1.70	8.83
1981-83	0.12	7.18	22.05	1.42	30.83	61.07	1.52	4.21	2.37
1991-93	0.00	3.38	18.02	1.57	22.96	68.89	1.14	7.14	-0.13
2001-03	0.01	1.31	10.59	1.55	13.45	58.91	0.26	14.94	12.44
Banaskantha									
1961-63	0.34	0.35	54.54	6.99	70.81	5.86	0.18	2.39	20.76
1981-83	0.07	0.12	46.75	7.58	60.76	16.78	0.15	2.75	19.56
1991-93	0.00	3.45	27.88	6.07	37.95	19.43	0.01	1.76	40.85
2001-03	0.00	6.20	26.94	5.38	38.51	22.70	0.00	2.02	36.77
Bharuch									
1961-63	6.06	2.51	12.08	6.23	32.53	5.90	0.02	50.79	10.76
1981-83	4.35	7.23	24.14	33.48	70.63	2.71	0.18	15.68	10.80
1991-93	3.96	4.28	16.74	34.13	59.22	4.23	1.06	15.45	20.04
2001-03	5.78	2.23	9.55	18.95	36.50	1.70	6.63	35.67	19.50
Bhavnagar									
1961-63	0.26	3.38	39.02	1.10	44.08	39.82	0.39	5.84	9.87
1981-83	0.23	6.10	32.57	1.24	40.14	42.68	0.34	11.79	5.05
1991-93	0.00	2.92	23.84	2.16	29.14	37.06	0.10	15.11	18.59
2001-03	0.01	1.19	18.31	2.36	21.88	42.76	0.02	33.92	1.42
Jamnagar									
1961-63	0.27	3.02	33.72	0.62	37.68	54.63	0.27	2.21	5.21
1981-83	0.04	5.25	19.99	2.98	28.25	61.50	0.55	2.56	7.14
1991-93	0.00	1.68	11.20	2.44	15.36	64.47	0.12	3.86	16.19
2001-03	0.00	0.78	7.23	2.51	10.52	75.00	0.03	5.35	9.10
Junagadh									
1961-63	1.24	3.55	21.68	1.48	29.53	56.59	0.44	6.30	7.14
1981-83	0.37	8.74	9.33	2.83	21.28	65.12	2.07	3.61	7.92
1991-93	0.04	6.37	11.68	2.10	20.19	63.03	1.32	2.70	12.76
2001-03	0.00	4.23	4.60	2.66	11.49	64.15	0.61	4.75	19.00
Kutch									
1961-63	0.00	1.24	42.37	15.00	58.87	13.56	0.04	13.75	13.78
1981-83	0.00	2.10	27.09	22.00	56.90	18.40	0.00	6.28	18.42
1991-93	0.00	1.81	19.48	12.20	31.95	20.76	0.07	5.87	41.35
2001-03	0.00	1.99	11.91	10.01	23.90	21.51	0.02	6.98	47.59
Kheda									
1961-63	14.56	6.14	21.01	5.32	56.09	10.78	0.01	11.84	21.28
1981-83	21.80	9.04	33.57	4.80	65.52	7.45	0.16	6.07	20.80
1991-93	19.24	7.64	21.33	4.67	53.39	6.49	0.09	2.09	37.94

2001-03	21.64	9.81	24.52	3.60	59.57	4.97	0.04	2.56	32.86
Mehsana									
1961-63	1.35	6.23	43.19	5.82	58.50	13.09	0.07	13.53	14.81
1981-83	1.46	9.45	37.88	5.64	56.80	19.12	0.04	10.10	13.94
1991-93	1.29	7.39	15.91	3.40	28.46	29.15	0.00	8.26	34.13
2001-03	0.98	6.45	13.90	4.94	26.27	15.64	0.00	12.00	46.09
Panchmahals									
1961-63	22.53	4.38	28.18	14.91	78.67	14.49	0.03	4.47	2.34
1981-83	21.58	4.90	37.63	12.17	86.57	4.67	0.04	5.76	2.96
1991-93	19.32	4.98	35.46	17.13	78.25	5.04	0.01	2.58	14.12
2001-03	18.10	1.68	44.50	12.39	76.67	1.22	0.01	1.39	20.71
Rajkot									
1961-63	0.39	2.09	28.39	0.69	31.54	54.32	0.31	12.16	1.67
1981-83	0.09	7.98	16.04	1.81	25.93	52.84	2.09	15.73	3.41
1991-93	0.00	4.35	10.67	2.50	17.57	58.12	0.26	12.92	11.13
2001-03	0.00	1.15	6.97	2.45	10.58	61.00	0.02	25.06	3.34
Sabarkantha									
1961-63	6.64	5.62	24.16	3.08	41.89	27.59	0.12	23.19	7.21
1981-83	4.23	9.15	31.29	9.78	56.48	13.30	0.17	22.37	7.68
1991-93	3.07	8.81	32.58	30.32	64.81	21.66	0.11	2.71	10.71
2001-03	2.64	5.52	27.25	14.42	49.83	16.79	0.05	6.56	26.77
Surat									
1961-63	17.46	2.31	17.74	12.02	56.64	10.54	0.85	27.82	4.15
1981-83	14.97	2.16	24.29	14.14	58.23	4.58	12.26	5.76	19.17
1991-93	17.04	1.86	14.10	11.29	44.70	5.45	16.48	1.34	32.03
2001-03	16.19	1.15	8.59	6.80	32.74	3.74	23.83	0.96	38.73
Surendranagar									
1961-63	0.08	3.27	35.38	1.26	40.30	14.94	0.01	39.44	5.31
1981-83	0.13	2.85	27.15	3.28	35.16	6.04	0.09	56.32	2.39
1991-93	0.08	2.12	16.40	3.81	22.41	12.91	0.12	47.60	16.96
2001-03	0.10	1.87	9.87	1.71	13.55	16.33	0.04	56.83	13.25
The Dangs									
1961-63	16.79	0.25	0.92	17.29	75.73	13.40	0.00	0.10	10.77
1981-83	15.10	0.33	1.94	18.82	90.70	11.23	0.00	0.00	-1.93
1991-93	14.94	0.07	5.53	14.94	80.69	1.91	0.00	0.00	17.40
2001-03	22.53	0.17	36.44	14.67	73.81	7.22	0.00	0.00	18.97
Vadodara									
1961-63	12.11	1.16	11.41	5.88	38.15	5.65	0.03	43.29	12.88
1981-83	10.64	2.06	17.10	17.93	54.56	2.90	0.07	28.00	14.47
1991-93	10.76	2.74	19.03	26.21	59.00	7.08	0.31	23.22	10.39
2001-03	9.35	1.41	14.10	20.29	45.15	3.09	0.24	29.37	22.15
Valsad									
1961-63	24.41	0.23	4.01	12.21	48.21	2.63	0.40	7.94	40.82
1981-83	31.44	1.06	5.16	10.75	53.98	1.24	3.19	0.49	41.10
1991-93	31.48	0.44	0.76	4.38	39.55	0.42	6.80	0.00	53.23
2001-03	34.10	0.26	4.54	6.57	45.47	0.24	10.11	0.00	44.18

Source: Season & Crop Reports, Deptt of Agri., Govt of Gujarat



Annex 2: Share of Selected Crops in Output of Districts

(at 1990-93 Constant Prices)

District/ Period	Rice	Wheat	Coarse C	Tur	Groundnut	Mustard	Sugarcane	Cotton
Ahmedabad & Gandhinagar								
1961-63	8.30	9.40	7.87	0.31	17.19	0.44	0.02	56.49
1981-83	25.91	16.76	11.43	3.31	1.32	1.73	0.24	39.30
1991-93	16.17	17.14	11.50	1.51	0.28	9.95	0.15	43.30
*2001-03**	23.70	23.76	11.92	1.52	1.00	1.82	0.11	36.16
Amreli								
1961-63	0.52	2.03	12.05	0.00	82.56	0.00	0.61	2.24
1981-83	0.11	9.54	24.79	0.00	59.25	0.53	0.79	4.99
1991-93	0.00	6.12	11.41	0.08	63.38	0.71	0.79	17.51
2001-03	0.01	2.16	7.02	0.14	72.32	0.12	0.15	18.08
Banaskantha								
1961-63	1.79	14.75	61.79	1.01	6.87	1.24	0.45	12.09
1981-83	0.19	12.36	39.58	1.97	0.59	38.33	0.08	6.91
1991-93	0.00	13.05	17.49	1.55	0.82	61.81	0.02	5.26
2001-03	0.00	20.85	22.64	0.71	0.73	51.29	0.00	3.77
Bharuch								
1961-63	3.37	1.03	10.94	2.47	8.55	0.00	0.02	73.63
1981-83	3.51	4.93	19.09	47.63	2.77	0.12	0.17	21.78
1991-93	3.12	3.75	12.34	41.40	5.92	0.14	0.93	32.39
2001-03	6.21	3.20	8.11	19.15	1.44	0.04	4.98	56.88
Bhavnagar								
1961-63	0.34	4.25	17.36	0.00	68.10	0.06	0.42	946.00
1981-83	0.25	8.53	11.78	0.00	64.38	0.16	0.15	14.75
1991-93	0.00	4.43	14.92	0.15	45.17	0.11	0.08	35.15
2001-03	0.02	1.73	13.26	0.25	52.24	0.11	0.01	32.38
Jamnagar								
1961-63	0.36	3.39	4.86	0.00	87.29	0.00	0.28	3.83
1981-83	0.07	9.29	6.53	0.00	74.97	4.51	0.43	4.22
1991-93	0.00	5.52	7.58	0.25	67.37	1.61	0.20	17.48
2001-03	0.00	1.99	4.62	1.06	83.98	0.12	0.03	8.20
Junagadh								
1961-63	0.94	2.83	5.34	0.00	83.45	0.00	0.20	7.23
1981-83	0.39	13.57	4.42	0.00	75.79	0.17	1.30	4.37
1991-93	0.07	11.92	7.25	0.00	73.69	0.14	0.73	6.20
2001-03	0.00	5.95	2.52	0.34	85.35	0.05	0.28	5.50
Kutch								
1961-63	0.00	6.52	19.27	0.00	39.23	0.20	0.06	34.72
1981-83	0.00	6.93	26.70	0.12	49.23	1.26	0.02	15.74
1991-93	0.00	5.75	12.80	0.00	60.96	3.73	0.09	16.69
2001-03	0.00	7.19	9.02	0.00	54.70	2.98	0.03	26.08
Kheda								
1961-63	21.29	4.44	17.44	4.19	24.30	0.00	0.01	28.33
1981-83	35.41	13.44	21.89	4.11	16.15	0.89	0.14	7.97
1991-93	36.60	12.55	23.54	6.26	10.82	5.66	0.07	4.50
2001-03	35.65	19.71	31.22	3.85	0.60	2.33	0.04	6.61
Mehsana								
1961-63	2.81	12.52	32.21	1.84	16.40	3.11	0.06	31.03

	1981-83	1.88	18.45	27.24	2.43	1.14	29.89	0.03	18.94
	1991-93	1.25	17.43	14.10	0.55	0.56	50.82	0.00	15.29
	2001-03	2.34	22.09	17.02	0.51	1.46	26.87	0.00	29.71
Panchmahals									
	1961-63	24.81	4.03	27.51	3.39	29.90	0.00	0.02	10.33
	1981-83	21.49	8.31	42.68	8.62	8.67	0.21	0.04	9.98
	1991-93	12.18	10.35	35.26	22.50	12.31	1.61	0.01	5.79
	2001-03	6.58	3.69	69.33	16.40	0.97	0.28	0.01	2.73
Rajkot									
	1961-63	0.43	1.72	5.27	0.00	81.09	0.00	0.17	11.32
	1981-83	0.13	16.32	7.37	0.00	47.57	1.61	0.83	26.17
	1991-93	0.00	11.88	4.79	0.13	42.17	1.39	0.27	39.37
	2001-03	0.00	3.00	5.16	0.25	65.70	0.06	0.02	25.81
Sabarkantha									
	1961-63	4.08	4.37	14.85	0.25	44.27	0.00	0.07	32.10
	1981-83	3.75	13.26	18.15	5.57	14.50	0.64	0.09	44.03
	1991-93	4.66	16.49	27.27	19.55	18.97	7.73	0.10	5.23
	2001-03	5.90	11.50	40.66	5.57	18.26	2.58	0.05	15.46
Surat									
	1961-63	27.33	1.15	13.10	4.92	19.31	0.00	0.66	33.53
	1981-83	26.64	3.28	22.06	15.73	7.14	0.00	10.76	14.38
	1991-93	35.71	2.86	13.17	16.48	12.73	0.00	15.34	3.72
	2001-03	41.63	2.26	10.28	9.60	11.92	0.02	22.83	1.47
Surendranagar									
	1961-63	0.16	4.60	9.50	0.00	24.71	0.00	0.01	61.02
	1981-83	0.29	3.75	9.09	0.00	7.08	0.14	0.04	79.60
	1991-93	0.17	2.90	8.26	0.00	10.40	0.55	0.12	77.59
	2001-03	0.16	4.62	10.38	0.03	10.73	0.09	0.04	73.94
The Dangs									
	1961-63	69.85	0.00	2.16	24.55	3.44	0.00	0.00	0.00
	1981-83	47.45	1.17	3.56	35.00	12.81	0.00	0.00	0.00
	1991-93	42.50	0.47	7.63	40.79	8.60	0.00	0.00	0.00
	2001-03	44.94	0.98	14.76	13.57	25.72	0.00	0.04	0.00
Vadodara									
	1961-63	7.77	0.80	10.67	5.27	12.50	0.00	0.03	62.96
	1981-83	6.38	3.13	24.35	17.42	3.13	0.03	0.04	45.52
	1991-93	7.47	4.04	12.75	31.00	7.08	0.34	0.24	38.08
	2001-03	6.61	2.88	14.75	22.59	2.62	0.10	0.20	50.24
Valsad									
	1961-63	71.48	0.21	4.90	4.45	5.07	0.00	0.51	13.36
	1981-83	80.36	2.57	4.97	7.27	1.00	0.00	2.86	0.97
	1991-93	86.31	0.92	0.34	4.56	1.10	0.00	6.76	0.00
	2001-03	85.25	0.62	0.82	4.22	0.62	0.00	8.46	0.00
Gujarat									
	1961-63	7.92	4.29	14.71	1.56	41.13	0.25	0.20	29.94
	1981-83	7.79	10.90	15.92	4.83	34.25	5.50	0.81	20.01
	1991-93	9.08	9.22	13.59	7.50	27.14	9.67	1.19	22.62
	2001-03	8.48	7.94	13.94	3.99	36.22	5.60	1.55	22.29

Source: Season & Crop Reports, Deptt of Agri., Govt of Gujarat ; Constant TE 1993 prices

FAILING AGRICULTURE, LIVELIHOOD STRUGGLES AND POVERTY IN MADHYA PRADESH

By

D.C. SAH

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

Failing Agriculture, Livelihood Struggles and Poverty in Madhya Pradesh

D.C. Sah *

Madhya Pradesh is regarded as one of the BIMARU (chronically sick) states of India along with Bihar, Rajasthan, Uttar Pradesh and Orissa. Its sickness is reflected in almost all dimensions of development, ranging from economic and social development to human development as well as in the quality of life of the people. What is even more intriguing is the fact that there has been little improvement in the relative position of the state vis-à-vis other states in most of the dimensions of development. This is so when Madhya Pradesh has probably the best potential to get rid of its chronic sickness. Post-independent Madhya Pradesh, like rest of India, has experienced the rhetoric of expansion of economic activities and social opportunities. But still the state mirrors the reality of stagnation, economic poverty and social deprivation. As promoter of social and economic change through planned development, state suffers from a perpetual incompatibility inherent in an economy where interests of various groups are different. The peasant interests have covert aim to perpetuate the elite class of rural leaders. These elite classes are rich middle size landowners whereas the poor peasantry constitute of sizeable small farmers. At the bottom of the hierarchy are marginal farmers and landless labours. The demand of the elite class is production support - cheap labour, credit, water, education, markets *et cetera*. The poorest stratum wants employment and better wages. But the state on the one hand represents the interests of middle peasantry and on the other tries to smoothen the inherited inequality and injustice faced by large masses. This paper aims at unfolding and reconstructing the play of these contradictions in predominately agrarian Madhya Pradesh. It is hypothesised that play of these forces is constraining development in Madhya Pradesh.

The paper is divided into four sections. The first section reviews the pattern of post-reform growth in Madhya Pradesh and tries to associate failing agriculture as the major anxiety in the well-being of its masses. The next section places the implications of the indifferent agriculture and the nature of deprivations it has caused. The third section conceptualises the why people in remote rural areas are trapped in poverty. The last section presents conclusions of the study.

I. Failing Agriculture in Madhya Pradesh

Estimates of GDP and NDP for Madhya Pradesh are available in two series: 1980-81 series and 1993-94 series (Government of Madhya Pradesh 1998; 2005). The 1980-81 series provides information for the undivided Madhya Pradesh, as it existed before 1 November 2000 for the period 1980-81 through 1997-98 at current prices as well as at 1980-81 prices. The 1993-94 series provides information for the existing Madhya Pradesh and relates to the period 1993-94 through 2003-04 at current as well as at 1993-94 prices. Because of the geographic differences as well as different approaches adopted in their construction, the two series cannot be combined into one integrated series. According to the 1980-81 series, the economy of the undivided Madhya Pradesh grew at a rate of 4.6 per cent per year during the period 1980-81 through 1997-98. On the other hand, according to the 1993-94 series, the economy of the existing Madhya Pradesh increased at a rate of 3.9 per cent per year during the period 1993-94 through 2003-04. These growth rates suggest that the economy of the state is yet to pick up the momentum.

This growth has also been skewed; the growth of the farm sector has been the slowest. The growth of the agriculture sector in the undivided Madhya Pradesh was less than 3.5 per cent in between 1980-81 and 1997-98 whereas, it was negative in the existing Madhya Pradesh during

the period 1993-94 through 2003-04 (Table 1). Growth has also been poor to very poor in the forestry sector and in electricity, gas and water supply in the existing Madhya Pradesh according to the 1993-94 series. By contrast, growth has very rapid in the banking and insurance as well as in the transport sector in both the undivided and the existing Madhya Pradesh. Growth has also been very rapid in the construction sector in the existing Madhya Pradesh during the nineties. In public administration also, the growth has been quite rapid in both the undivided and the existing Madhya Pradesh in the eighties as well as in the nineties.

If the pattern of growth in different sectors of the economy of the existing Madhya Pradesh is any indication, then it is clear that economic growth in the existing Madhya Pradesh has virtually been confined to non-agriculture sector; the agriculture sector has remained grossly neglected. In the context of human development, it would be interesting to examine whether the shift in patterns of production has also resulted in a similar shift in the pattern of employment in the agriculture and non-agriculture sector.

Table 1: Growth in the Economy of Madhya Pradesh at Factor Cost

Factors of production	Annual growth rate undivided Madhya Pradesh for the period 1980-81 through 1997-98 (1980-81 prices)	Annual growth rate existing Madhya Pradesh for the period 1993-94 through 2003-04 (1993-94 prices)
Agriculture	3.484	-0.0285
Forestry	8.205	1.182
Fishing	14.255	7.189
Mining and Quarrying	4.741	6.292
Manufacturing	7.215	5.274
Construction	0.681	11.240
Electricity, gas, water supply	16.090	0.461
Transport	7.469	9.519
Trade, hotel and restaurants	5.066	2.692
Banking and insurance	11.018	10.106
Real estate	3.834	4.788
Public administration	6.014	5.380
Others	5.882	5.766
Total	4.578	3.881

Source: Sah and Chaurasia (2005)

The other feature of economic growth in Madhya Pradesh is that most of the growth in the economy has been subsumed by the rapid growth of the population. Between 1981 and 2001, the population of the undivided Madhya Pradesh increased from around 52 million in 1981 to around 81 million in 2001 whereas the population of the existing Madhya Pradesh increased from around 38 million in 1981 to around 60 million in the year 2001. As the result, the per capita gross domestic product at 1980-81 prices increased at an average annual rate of 2.66 per cent per year in the undivided Madhya Pradesh during 1980-81 through 1997-98 whereas the per capita net domestic product increased by 2.36 per cent per year. Similarly, in the existing Madhya Pradesh, the per capita gross domestic product at 1993-94 prices increased at an average annual rate of just 1.97 per cent per year between 1993-94 and 2003-04 while the rate of increase in the per capita net domestic product was only 1.79 per cent per year. As the result of the rapid population growth, a substantial proportion of the economic growth in the state - undivided as well as existing - has been subsumed to meet the basic needs of the growing population. There has been only a marginal increase in the average personal income of the people of the state.

But what is concerning about the economy is insignificant transition in its structure (Table 2). Although, the share of the primary sector in the economy of the state has decreased and in last five years has been negative, yet, the economy of the state continues to depend very heavily on this sector. In the existing Madhya Pradesh, the primary sector of the economy accounted for nearly 45 per cent of the net domestic product in real terms in the year 1993-94. This proportion decreased to around 35 per cent in the year 2003-04. However, the increase in the contribution of other sectors of the economy has comparatively been much slower. For example, the contribution of the industrial sector increased by around 5 per cent while that of trade increased by around 2 per cent. Similarly, the contribution of the financial sector also increased by around 2 per cent whereas the contribution of the community services increased by only around 1 per cent. Obviously, the transition in the economy of the state during the 20 years between 1980-81 and 2003-04 has been too slow to lead to any significant re-structuring of the social and economic production system, especially in the vast rural tracts of the state. This very slow transition in the economy of the state indicates that the state economy has virtually remained stagnant during the 20 years under reference and that there has been little vibrancy in economic growth. The grossly unsatisfactory growth of economy reflects this lack of vibrancy.

Table 2: Transition in the Structure of the Economy of Madhya Pradesh

Year	Share to the Net Domestic Product, (1993-94 prices) **Existing Madhya Pradesh**				
	Primary	Secondary	Trade	Finance	Community
1993-94	44.83	18.24	16.19	8.42	12.32
1994-95	42.89	20.25	15.65	8.71	12.51
1995-96	41.66	20.70	16.37	8.73	12.54
1996-97	41.26	20.15	16.71	9.21	12.67
1997-98	39.90	20.96	17.41	9.52	12.21
1998-99	38.56	22.33	17.30	9.07	12.73
1999-00	36.87	25.45	16.64	8.53	12.51
2000-01	30.80	26.48	16.76	10.86	15.10
2001-02	34.54	23.80	17.36	10.49	13.81
2002-03	29.77	25.52	17.90	11.86	14.96
2003-04	35.20	23.51	17.99	10.47	12.82

Source: Sah and Chaurasia (2005)

A negatively performing agricultural sector that supports over 67 per cent of population with stagnant growth of employment, calls for serious debate on the its affect on well-being of the people. The next section traces the intricacies of the agricultural and its social-economic fallout in a larger section of the deprived communities.

II. Intricacies of Failing Agriculture

Lopsided Growth in Primary Sector

As industrial performance of Madhya Pradesh is indifferent, growth and stagnation in agricultural production is responsible for bulk of the variations in the economic performance of the state. But the agricultural sector of the state continues to be less developed and depends upon vagaries of the monsoon. With less than a fourth of its gross cropped area under irrigation, agriculture production has shown relatively high instability over the years.

Being predominantly rain fed, unirrigated paddy, jowar, soybean and pulses are its main crops during *kharif*, whereas wheat, barley and gram are its main crops grown during *rabi* season with

residual moisture as well as irrigation. About 98 per cent of gross cropped area of the state is under foodgrains and oilseeds. A dramatic development in Madhya Pradesh agriculture has been introduction of soybean. Soybean created double cropping a reality in the whole of the Malwa and parts of central Madhya Pradesh in late 1970s.The region has black cotton soil, which is uncultivable during rainy season. As a result, farmers kept a large part of the land as kharif fallow and grew wheat during *rabi* on the fallow land. Introduction of soybean made it possible to use this current fallow during *kharif* under soybean and after harvesting it, used the land for growing wheat in *rabi*. Success of soybean -- as its prices started increasing and short duration improved varieties started flooding the rural markets -- motivated farmers to replace minor cereals by soybean. As a result, between 1980-81 and 1999-2000 area allocated to other cereals reduced from 27 per cent to less than 11 per cent. A large part of the increase in soybean area has come at the cost of minor cereals, especially jowar. The other important feature of Madhya Pradesh agriculture is substantial increase in yield of major food crops during 1980s and 1990s, especially wheat. This increase in yield was possible because of introduction of improved HYVs that are suitable for even residual moisture conditions and also because of state support for creating rural infrastructure that supports agricultural production, especially input-output markets and extension.

It can be argued that bulk of the growth in agricultural production post-1980 in the state is contributed by improvement in the yield where as pre-1980 it was expansion of area under crops that contributed most to the growth of agricultural production. Although, the impact of yield on agricultural production of Madhya Pradesh cannot be overemphasised, the production has become highly unstable owing to high risk associated with HYVs under uncertain weather and low irrigation. Moreover, the levels of yield of major crops in the state are about half of the yields attained in neighbouring western India for major foodgrains.

The growing instability in the agricultural production and productivity in Madhya Pradesh is attributed to declining capital formation in agricultural sector (Minocha: 2001). This decline in agricultural capital formation has been more constraining in post- reform period because of declining allocation to agriculture and rural development. The other reasons for relatively poor performance of agricultural sector are existence of a large number of small and marginal farmers who are unable to invest in adapting agricultural technology; poor irrigation infrastructure; relatively low yield increasing input use especially chemical fertilisers; and large scale soil erosion during early monsoon and prolonged moisture stress during latter part of the agricultural year. All these reasons are responsible for relatively low performance of agricultural sector of Madhya Pradesh in comparison to other states of the region. This indifferent performance of agriculture is not only constraining the economic performance of the state, this dismal performance is also reflected in the levels of social and economic deprivation in the state. The indifferent performance of agricultural in Madhya Pradesh, however, provides an opportunity to exploring the rationale for this strategy of development.

The compulsion for keeping the prices of wage goods -- the foodgrains -- low was universal for Indian planners. In order to legitimise the state, equally strategic was altering the stagnation in agricultural production. With expansion of area as a source of production gains getting exhausted over the time, the need to increase productivity of land became overriding. But a responding production system requires a very different production relationship than the *zamindari* system, which had a large tilling mass with no land rights. The first agenda of Indian state, therefore, was land reforms. Madhya Pradesh economy also operated with similar concerns. After independence, Madhya Pradesh like other states enacted a series of legislation for abolition of *zamindari* system, securing rights of tenants and imposing ceiling on size of agricultural holdings.

As the euphoria of land reforms died down and the futility of the *leftist agenda* became clear, the state has to bear the burden of this failed agenda; a highly unequal distribution of land in Madhya Pradesh, despite a series of land reforms, constrained the agricultural technology transfer. It can be argued that land augmenting seeds-fertiliser technology in Madhya Pradesh has benefited most to middle size farmers though the small farmers retained the traditional productivity advantage on other crops. This was mainly because of inherent advantage of small farmers with respect to higher cropping intensity, better labour absorption and superior farm management including traditional water harvesting (Rao and Storm: 1998). But on the large size of farm the productivity gains were at the cost of labour. Implications of this process of productivity gains are not encouraging for Madhya Pradesh agriculture. For, this made the base of seed-fertiliser technology too narrow to create a rapid acceleration on agricultural productivity. And more importantly, its linkages with labour absorption remained too weak.

A sizeable impetus to Madhya Pradesh agriculture came in 1980s with introduction of soybean. This not only opened up avenues of double cropping, it ushered an environment where increase in farm income could, to some extent, cut across different size of farms. It can be argued that despite a slow growth in yield of foodgrains, production has grown faster in Madhya Pradesh only because an improvement in the contribution of change in allocation of land to different crops. But the major beneficiaries of this development in 1990s are medium size farmers. For, this is the ideal size of farm where a farmer could experiment, adapt as well as invest sufficiently -- seeds, weedicide and phosphatic fertilisers -- on costly inputs. The optimality of input use on medium size farms resulted in substantial yield differential across farms. Yield on medium size farms are over 1.5 to 2 higher than other farmers, including large size farms. The large size farmers found it extremely difficult to invest on inputs at optimal rates because of the share scale of investment was high enough to take that type of risk. The medium size of farmers with their characteristically low consumption elasticity had large investable surplus that found avenues of on-farm investment especially deepening and energising their wells. This investment further improved the land productivity of these farmers. On the one hand they could easily bear the risk of prolonged water stress during rainy season and on the other could irrigate their wheat during *rabi* season, notwithstanding the ecological disequilibria it created.

The gains of new agricultural technology, owing to investment constrains, thus, have remained confined to only a section of middle size irrigated farmers. On the other hand, labour-replacing inputs did reduce labour absorption in agriculture. This development strategy, evidently, excluded a large mass from economic opportunity in the state. It can be argued that unequal economic opportunities not only constrained access to market and resources to a large section of rural masses but also resulted in depressing income, wage rate and labour absorption. The final outcome of unequal development is perpetuation of social disparity and lack of public pressures to improve social opportunities.

Inequality and Social Poverty

Some idea about the impact of the economic growth and associated economic development on economic inequality can be made on the basis of the trend in the proportion of the population living below the poverty line. According to the estimates prepared by the Government of India, the proportion of population living below the poverty line in Madhya Pradesh decreased from 49.78 per cent in 1983 to 37.43 per cent in 1999-2000 (Government of India, 2002). However, the limited impact of economic growth on household income can be judged from the fact that the total population living below the poverty line in the state increased from 27.797 million in 1983 to 29.854 million in 1999-2000. In proportionate terms, poverty in the state appears to have decreased over time but the actual number of families living below the poverty line has actually

gone up during the twenty years under reference. In other words, with the growth and expansion of the economy in the state, the number of 'have nots' have also gone up. This shows that economic growth and economy driven development in the state has not been able to reduce the number of people living in absolute poverty, although, there has been some rapid reduction in the proportion of population living below the poverty line. Majority of the households in absolute poverty are from the districts where the social and economic development remains poor. Remote tribal areas are one such group in Madhya Pradesh.

The tribal belt of Madhya Pradesh is characterised by resource poor, technologically stagnant, and remote from state and market where depletion of resources like land, forest and water has a history (Sah: 2003). In this situation, the livelihood struggles and coping with resourcelessness contribute to high incidence of poverty. About half of the population lives in economic poverty. Apart from land, silver, livestock and irrigation wells in tribal areas, are considered major assets, depletion of which, as will be seen, forces households into a social process that pushes poor households into chronic poverty. Over a third of poor are chronic poor in tribal Madhya Pradesh.

Chronic poverty is not a product of economic forces alone; it manifests through social processes created by shocks or resourcelessness. The livelihood struggles end up creating a vicious circle of multidimensional Unfreedom: livelihood struggles under shocks prompt a social process of mortgage and asset losses, borrowing and inability to service debt, hunger and migration. This livelihood mechanism does provide sustenance but at the cost of freedom, in a multiple way, to the households. Their lack of freedom lies in their access failure to land and natural capital. But their livelihood struggles force Unfreedom on their family members; they live in inhuman conditions at the destination, their access to education severed, their opportunity to develop skills adversely affected and health services and sanitation made poor by any standard; above all, they often have to face abuses. Cumulatively, all these affect adversely their self-esteem. Disturbing it may appear but the process is difficult to break without massive drive to create new opportunities in the economy. Conceptually, as the representative democracy fails to prevent the creation of such opportunities, whereby the macro processes subsume the micro-variability of the economy; most likely the participatory democracy is a feasible option to safeguard their interests. The participatory democracy has capabilities to convert cumulative Unfreedom to distributive Unfreedom; households may remain economically poor but the political and decision-making power still rests, in the process, with them. The newly acquired political power has a potential to create situations that may prevent further concentration of Unfreedom. Prerequisite for this process to succeed is closer interactions between civil society, community and the state. This interaction may not directly influence individuals' access to capital; it nonetheless brings attitudinal changes in the bureaucracy and elected representatives on the one hand, and developing better understanding of community's rights on the other. This engenders confidence and self-esteem among the marginalised, paving a way for improving the quality as well as their access to political, social and economic infrastructure.

As those trapped in poverty are victims of a socio-political process, no matter how hard the economic policy interventions try to influence these groups, the poverty remains unaffected. For, these economic policy interventions are peripheral to tribal livelihood (Sah and Bhatt: 2004). As chronic poverty forces social processes that are dominated by shock induced access failure to production, that in its turn lead to borrowing at exuberant interest, debt-trap and asset losses, short-term land transaction and seasonal migration. Poverty trap, nonetheless, reduces significantly if private investment in irrigation takes place. But public investment in infrastructure and development of credit, input and output markets decreases risk of chronic poverty significantly for a large section of tribals.

Migration in absence of a sustainable livelihood has become unavoidable in remote rural areas. A shock or resourcelessness can push a household into a debt-trap and has to resort to migration as a coping mechanism. A way of reducing the incidence of migration is to intensify investment that conserves the soil-moisture and makes agriculture sustainable. Evidence reveals (Sah and Bhatt: 2004) that civil society initiatives in tribal areas have reduced seasonal migration significantly. Since migration in remote tribal areas is inevitable, the processes that facilitate migrants in the course of migration are as important as reducing migration. How to make the lives of migrants at the place of destination less stressful, provide them with amenities and make their position stronger in the labour market is as important as improving agriculture and increasing borrowing capacity of migrants at the place of origin. Access to institutional consumption credit, at low interest, is a soothing proposition compared to informal credit, at an exorbitant interest rate. Bringing such an institutional change may not reduce migration but shall certainly increase savings from migration. Breaking the debt-trap and strengthening agriculture of the area are two important interventions that may result in pulling people out of chronic poverty.

Failure of State

State failure to reach the masses except for providing elementary education has been one of the major reasons for high incidence of poverty in the state. The health indicators and health care delivery system is rudimentary in the state. Though education guarantee scheme has created a supply push, the demand for education makes enrolment and drop out rates relatively high. And the political decentralisation has created a new set of leadership that is unable to fulfil the aspirations of the masses. Some of these issues are contextual and need some elaboration.

Health Care Delivery:

The neglect of the health sector in the state can be judged from the fact that in the rural areas of the state, the death rate is highest in the country while the infant mortality rate is second highest and this situation has remained more or less unchanged throughout the period under reference. At the level of the state government, the initiatives taken to address the health needs of the rural masses appear to have fallen short of the expectations. On the other hand, the development and growth of the private health care delivery system is limited to largely to metropolitan towns and cities. Moreover, the private health care delivery system is literally confined to addressing the curative health needs of the people and therefore is too costly to the reach of the common people. The preventive and health promotive aspects of health care delivery remain grossly neglected in both rural and urban areas of the state as the public health care delivery system neither has the organizational efficiency nor the administrative capacity to meet the growing health care needs of the people. The rural health care delivery system in the state is almost totally dependent upon government initiatives and government resources but the government is constrained to invest in the system because of the constrained economy. The public health care delivery infrastructure in the rural areas remains awfully weak. At the same time, there is serious shortage of skilled manpower to meet the health needs of the people. There has been some attempt to improve the availability of skilled health service providers in the rural areas through the training of *Jan Swasthya Rakshak* and birth attendants - the tradition *Dai* - but there is gross deficiency in terms of efficiency and effectiveness of the approach. The whole public health care delivery system continues to be highly doctor oriented, bureaucratic and vertical in the approach, management and organization with the result that masses living in rural and remote areas continue to suffer.

Health sector investment and its low credibility in Madhya Pradesh is reflected in people's preference to health service providers; over 60 per cent of households in Madhya Pradesh prefer to access private health providers for treatment when a family member is ill. Only a third of

patients use public health services. Infant and child mortality in the state remains among the highest in India; it is 27 per cent higher than the corresponding all-India rate. Under 5 mortality rates are 45 per cent higher than the corresponding all-India figures. Most children in the state, irrespective of their social background, have a much higher risk of dying before age one than in the country as a whole. The risk of dying is exceptionally high for children from households with low standard of living, children from scheduled caste and scheduled tribe households, rural children and for children whose mothers are illiterate. Over half of the children are under weight and stunted. Girls, in Madhya Pradesh, are more likely than boys to be underweight or stunted. Under nutrition is particularly high among children of illiterate mothers, scheduled tribe children and households with low standard of living. Full immunisation coverage is not as high as it might be mainly because only a third of children have received all the 3 doses of DPT and only a third have been vaccinated against measles. Dropout rate for the series of DTP and polio vaccinations is very high (NFHS2: 1999).

Madhya Pradesh also reflects serious gender inequality and negligence with respect to female health indicators. A low male-female ratio in the state is indicative of gender bias in the society. Poor women, illiterate women and women from Scheduled Tribe and Scheduled Caste have much higher fertility than most other women. There is evidence of strong son preference in the fertility performances of women in the state. Given the near exclusive emphases on sterilisation, women tend to adopt family planning only after they have achieved their desired family size. Wife beating and other forms of domestic violence are fairly common in the state. Based in a weights-for-height index, more than one third of women are undernourished, and based on blood test, over half of women in the state have some degree of anaemia (NFHS2: 1999).

The only redeeming feature of human development processes in Madhya Pradesh is the progress in primary education, which has resulted in significant increase in the literacy rate during the 20 years under reference.

Supply Push for Elementary Education:

If one tries to examine the literacy rate and the levels of school dropouts in Madhya Pradesh in 1980s and 1990s, it shall not be an exaggeration to say that education in state was a luxury afforded by a few. But of late the state of primary education in Madhya Pradesh is witnessing a noticeable change: The literacy rate in 2001 is 64 per cent, which is close to the national literacy rate 65 per cent. The improvement over the years is pleasing; a growth in literacy of 19 per cent has been achieved in last decade ending 2001. By any standard, this is a hopeful achievement. Two important interventions, initiated by state governments, changed the elementary education scenario: Rajiv Ghandi Shiksha Mission (RGSM) and the Education Guarantee School (EGS) by RGSM.

Both RGSM and EGS forced supply as well as demand side changes in the primary education system. Universal access to primary education was the main objective of RGSM. The mission developed a model called *Padhna-Badhna Andolan* for larger societal involvement in the literacy campaign. Mission also gave expanded mandate of universalising access to elementary education and created school in radius of 3 Kms. It also tried to introduce improved textbooks at the primary level. Mission created infrastructure for training 'Jan Shiksha Kendra' at school clusters level and 'Janpad Shiksha Kendra' at Block Level for ensuring quality of education. Jan Shiksha Abhiyan was introduced as a step to create accountability for quality. All institutions and personnel of elementary education moved over to local body management. Three fourths of the Mission funds were spent through Panchayats. The major supply push, however, came through the EGS programme of 1997. This intervention by RGSM committed a school if there is a

demand for, even from a hamlet in a village. This supply push came in the wake of reforms in governance initiated by state after *Panchayati Raj* System became mandatory. The commitment of the state to supply primary educational services brought structural and functional changes. This positive change in the functioning of primary schools came when *Gram Panchayat* assumed an important role in establishment, management and day-to-day working of primary schools (Govinda: 2003).

The EGS programme gave right to the community to demand the *Gram Panchayat* to start a primary school in the locality. The *Panchayat* forwards the request for an EGS to *Zila* Panchayat. If the demand comes from the community with 25 children in tribal and 40 children in non-tribal areas and if the students have to travel more than a kilometre to attend a formal primary school, the state government commits resources for a teacher (called *Guruji*) and for the basic infrastructure. The community, however, has to provide space for EGS and manage the school affairs through parent-*Guruji* committee. By the early 2002, there were over 27 thousand EGS schools apart from 64 thousand formal primary schools in the state. These changes significantly reformed working of primary education system with positive as well as negative implications. There are two types of schools in the area, the formal primary schools and the EGS schools. There are also three types of teachers. The regular permanent teachers in formal primary schools; the *Shiksha Karmi* who is recruited on probation by Janpad *Panchayat* for the formal primary schools at about half of the remuneration compared to the regular teacher; and temporary EGS *Guruji*, a local teacher, nominated by the community and the Sarpanch.

The capabilities, commitment and interactions with community of these three types of teachers, however, vary significantly. *Guruji*, in general, is far more committed to his work and also far more accountable owing to his temporary nature of job in comparison with the *Shiksha Karmi*. As both *Guruji* and *Shiksha Karmi* are from the near by areas, their interaction with the community, in a school, is better.

Despite a significant supply push, the universalisation of elementary education has serious equity-based limitations. First, a relatively low literacy, is not only on account of the fact that the literacy rate of adult population is low but even among school-going-age children, the tendency of dropping out from school is high. About 20 per cent of school-going age girls & boys in Madhya Pradesh dropout after passing class 5. The out-of-school children comprise of never enrolled and dropout children. The analysis of reasons of children being out of school clearly reflects that it is the economic factors, as shall be discussed in length, that prevent the children from attending the school. Second, not only there are wide variations in literacy rates across districts of Madhya Pradesh but also districts with higher literacy rates tend to grow faster in literacy rates over time (Acharya: 2003). Third, the literacy rate among scheduled caste and scheduled tribe population is significantly lower than the rest. Lastly, a strong feeling among masses that the new education policy is creating a duality through its approach; the well-to-do have primary schools and the marginalised have to contend with EGS.

Rural community in Madhya Pradesh is, by and large, convinced of the need to educate their children. Increased job opportunities and informed citizen are two important benefits perceived by the community. Despite recognising these benefits, a sizeable proportion of rural poor, marginal farmers and agricultural labourers also believe that opportunity cost of sending their children to school is very high; high enough, not to educate them. For them, lost economic opportunity in the form of labour, grazing and taking care of siblings, weighs far more than the benefits of sending children to school. This is more so if the child is a girl. This is a contradiction in the society where a large proportion of the community do not send their girl child to school but

believe that the girls should attend school for, education creates a generation of females that are skilled, cultured and have better job prospects.

In remote rural area the major reason for poor enrolment is lack of demand for education. This is not surprising, for remoteness apart from provoking underdeveloped markets, rudimentary infrastructure and lack of opportunities, also places high opportunity cost on child's education. As opportunities in remote areas are few, any addition to family income either directly -- like child labour -- or indirectly, like relieving an adult for employment if the child takes up to grazing or look after siblings, is welcome at the cost of child's education. On the other hand, in relatively less-remote rural areas, apart from better access to infrastructure, markets and agricultural opportunities, primary education have also attracted imagination of non-poor households. This effect is slow in spreading to poor households.

The state has pinned its hope on community pressures to change perception of the parents who do not send their children to the school (Noronh: 2003). The village education committee (VEC) is considered to work as catalyst for bringing the change in the perceptions of the community. It is also hoped that the community participation in the management and running schools shall be able to solve the problem of in efficiency in primary education. Community participation and pressures could put an end to problems like absenteeism of teachers, irregular opening of school and improving the quality of primary education. It should, however, not be forgotten that rural communities of Madhya Pradesh is not a homogenous entity; the community, though socially homogenous and vibrant, is economically stratified and politically divided (Sah and Bhatt: 2004). The three elites -- political leaders, economically well-off farmers and social leaders -- contest fiercely on issues of development and deprivation. Community participation, thus, would be contextual to these stratifications, mediate between them for space in development issues, political economy of primary education and the educational awareness of the parents. In this situation, asking the village education committee for formal primary schools or parent-*Guruji* management body of EGS schools to manage, monitor and actively participate in the functioning of school is asking too much.

These findings are indicative of varying processes of universalisation of primary education in the Madhya Pradesh. The state efforts have significantly improved supply of educational infrastructure. But this may be only the first step towards universalisation of primary education. Sustainability of these efforts would depend on efficiency in managing the school affairs and, thus, creating demand for primary education. A high rate of out of school child not only reflects the caste-class-income characteristics and gender biases in the society but also is a pointer towards larger socio-political force that mould the parents' behaviour and quality of teaching. Large resources, financial and human, are needed to change these attitudes. Universalisation of primary education would remain a distance dream in Madhya Pradesh, if we are unable to generate these resources.

The focus and attention on universalising primary education, however, was associated with a neglect of higher education despite the fact that higher education system plays a crucial role in the processes of social and economic development by meeting the manpower needs of the social and economic production system (Mehrotra and Chaurasia: 2001). It may be argued here that although universalisation of primary education is a laudable goal in itself, it is the higher education system that really contributes to the productivity of the social and economic production system. The higher education system may further be divided into professional education and non-professional education. While the professional education is more closely linked to the productivity of the economic production systems, it is the non-professional education, which contributes to the building up the society and in shaping behavioural patterns. A unique feature of

the non-professional higher education system in the state is domination of the government institutions (Chaurasia, 1999). Private sector involvement or the economy driven investment in the non-professional higher education system in the state is extremely limited. One reason is that because of the dominance of the government, the non-professional higher education system in he state is not adaptive to the changing needs of the social and economic production system; it is gradually getting out of context. A similar situation prevailed in case of professional higher education also up till very recently. There is however a lot of private investment in professional education in the state. However, the higher education system in the state still lacks direction as far as economic growth and human development in the state is concerned.

Political Decentralisation at Grassroots Level:

The logic of decentralised governance, in contrast to economic development, was to bring the decision-making near to the people. The aftermath of 73rd constitutional amendment has provided needed support to *Panchayati Raj*. Madhya Pradesh government has also taken significant steps to decentralise political and administrative powers and initiated the pattern of *Gram Swaraj*. The decentralised governance has, however, been postulated on two basic but untested propositions. First, that the society with its structural rigidity would get a legal and institutional space through *Gram Swaraj* in order to operate in accountable as well as meaningful manner. This means, the introduction of *Gram Swaraj* would be able to homogenise the differences existing in the society owing to its stratification based on caste, class and gender lines. This homogenisation will result in an informed decision making at the grassroots level. Secondly, the policy makers, at the macro level, have faith in the new system's capability to deliver, and the development process, thus, will be more responsible as well as dependable than any of the earlier tested systems of governance. Even if these hitherto untested propositions are true, the fluidity in acceptance of a macro decision to reform the governance will depend on how the micro functionaries at the grassroots are interpreting and adapting the macro process. It is quite likely that traditional power centres still have overbearing influence in the new governance for the polity to operate democratically.

More anxious, however, will be situations where decisions in the newly created institutions succumb to pressures of traditional power centres. Past experience of working of decentralised governance would not dissipate these anxieties. The new system could also have a level of participation that renders the grassroots institutions just a formality with no cogent decision making role. That the informality observed in the forming of various stakeholders' committees -- eight committees deal with decisions relating to agriculture, health, infrastructure, education, justice, defence, development and assets -- could make them surrogate of the traditional power centres. In order to critique the execution of the decentralisation process it is necessary to understand how the new system is resolving the: (a) constraints imposed by the traditional social hierarchy and power centres; (b) conflicts in various stakeholders' committees; (c) differences on decisions taken at stakeholders' committees and the Gram Sabha; (d) exclusions that restrict participation of marginalised groups, tribal, *dalit*, women *et cetera*, in decision making; (e) resource crunch that is forced on these institutions because of economic liberalisation. A quick assessment of the decentralisation process by informal discussions with gram panchayat representatives establishes the fact that in its new incarnation *the Gram Swaraj* is no different than its predecessor. As shall be discussed, there seem to be a breakdown in the governance in the western Madhya Pradesh owing to process that excluded community from the decision-making.

Gram Swaraj in Madhya Pradesh is a bold step to restructuring decision making at the grassroots level. The politics of decentralised governance in last eight years has made its presence felt by breaking the stronghold of traditional power centres. A number of elected leaders belonging to

lower social groups have emerged in the village politics. But this is not enough to bring decision making nearer to the masses. In some guise, the structural constraints still influence functioning of the Panchayati Raj institutions. Absence of formal civil society in the region has made communities totally depend on state for development. State's development intervention is through *Panchayati Raj* institutions in the form of schemes. Although execution of these schemes has shifted to grassroots levels, the resources for them are still controlled by higher echelons. With significantly large proportion of funds allocated in the form of centrally sponsored schemes, the decentralisation process has bypassed people. Local priorities do not find space in the panchayats' plans. As a result, *panchayats* are reduced to identifying locations and beneficiaries for *top-pushed* schemes. Since at eight out of ten places in the region *Gram Sabhas* have not met in last one year, the decentralisation process has not only resulted in mis-identification of purpose and persons but has also adversely affected people's participation. The initial enthusiasm of governance through *Gram Sabha* has dissipated and community's demands have remained largely unfulfilled. In one year of inception of *Gram Swaraj*, a large proportion of *Gram Sabha* have not met either due to lack of quorum or the traditional power structures do not want the institutions to function. The first meeting of *Gram Sabha*, where various stakeholders' committees are formed, have taken place. But after this *Gram Swaraj* in its new incarnation has failed to homogenise the structural rigidity that divides rural society. Although the traditional leadership has given a way to new elected leadership -- where *dalit* and OBCs have challenged the upper caste hegemony -- the established social hierarchy still play a dominant role in village politics. *Sarpanch* owing to defunct *Gram Sabha* has become important institution in the village. The traditional leadership strive to control the decisions of *Gram Panchayat*, thereby further reducing *panchayat's* commitments towards *Gram Sabha*. In a number of gram panchayats where *Dalits* or women hold the position of *Sarpanch*, the secretary (*Panchayat karmi*) surrogates interests of traditional social structure and obstructs the decision making process. But wherever the traditional leadership is able to control, Gram *Sabha* has regularly met at least in the guise of *Panch* meeting. But even such arrangements only protect the interest of well to do or those who are near to the leadership, thereby excluding the poor from decision-making process.

Available evidence (Sah: 2003) reveals that the process to choose those whom the individuals want them to govern is free and fair. People have used their franchise in deciding who would govern them freely. But the process created fissures in an apparently homogenous community with social, political and economic interests. Once the political leaders took over their responsibility, the process of decentralised governance, instead becoming participatory, became highly centralised. The gains of the decentralised governance have been too few and highly iniquitous. Community's expectations remained unfulfilled and participation slowly dwindled. The role of *Sarpanch*, and the exclusive group of his people sharing interest, has made people lose their faith on *Panchayat*. Political decentralisation has not only fractured the apparent homogeneity of the society but has also made governance highly centralised.

The community does monitor how the governance is neglecting it. But it, however, does not get enough opportunity to register its protest about this governance. There are provisions of recall a corrupt *Sarpanch* but the community by and large is unaware of these. It is only once in five year that they get the freedom to punish bad governance by rejecting those involved in the governance. More seriously, the community has no freedom in the process of planning programmes according to its needs. The blame for this Unfreedom to decide what and how the local development should take place falls at various levels. First, the process of centralisation at the *Panchayat* level is too overpowering for community to exert pressures for participatory process to begin. Secondly, the quantum of financial allocation is too thin to meet the demands of the community. Third, the desire of the bureaucracy and the elected representatives, at higher echelons -- to control the activities and finances of the *Gram Panchayat* -- does not allow the independences to the

Panchayat. Lastly, existing laws that govern the natural resources obstruct the process of giving their control to the community, thus further marginalising the vulnerable section of the society. (Sah: 2004). It is this anxiety that brings us to the marginalisation of the poor in the politics of democracy.

The economy performs within the rules formulated by the markets. The markets govern the production and distribution of goods and services. Although in theory the markets are equal opportunity providers, in practice they also marginalise. The markets discriminate against the producers with poor technology, poor resources and poor skills. About a third of the population in Indian rural setting are excluded from markets as producers. Sadly, they are also the individuals whom the market marginalises as consumers. Markets marginalise the consumers that do not have purchasing power. Thus, a daily wage earner, a tribal and dry land farmer is discriminated against by market as consumer owing to lack of purchasing power. The irony of the decentralisation process is that there are no procedures that address the issue of market failure. In fact, the economics of non-market procedures - price support, subsidy and food distribution - are so complexly intertwined that even the non-market processes marginalise the poor. The question is how to weave the economic development with the political decentralisation?

In the last eight years of it's working in Madhya Pradesh, Panchayati Raj has brought considerable transformation in social relations. At one level, the traditional leadership has given way to elected leadership. *Dalits* and OBCs have challenged and displaced the upper caste hegemony. But Panchayats also have become the ground where the social hierarchy tries its best to re-establish. At the other level, political decentralisation has its own limitations. Political decentralisation and breaking down of the upper caste hegemony does not necessarily mean social transformation. At best, it is the first step towards it. Different social and marginalised groups have gained access to decentralised governance but the battle for livelihood is controlled by the institution that do not fall in the purview of decentralised governance. Until the marginalised, because of exclusion, are tackled at the *Gram Sabha*, decentralisation has little to offer for social and economic transformation.

In a sense, what is being attempted is linking polity, economy and community with state. This could alter top-down approach to community-cantered approach, project-based approach to policy-based approach, and beneficiary approach to community monitoring approach. Will it work in reducing economic poverty and creating social opportunities, is a question that time alone would answer. Nevertheless, before getting into empirically examining some of these larger issues, it might be useful to take a snapshot of the status of income poverty across districts and its correlates.

III. A Framework to Understand Chronic Poverty

Hulme, Moore and Shepherd (2001) have identified three inter-linked conceptual issues that define well-being beyond income poverty. First, development is about pursuit of freedom: Dreze and Sen (1989) define these freedoms as economic opportunities, social opportunities, political freedom, transparency and trust in the community, and security [1]. Second, ill being has an inbuilt time dimension; some people always remain poor, some are transitory poor and some are non-poor all through [2]. Lastly, chronically poor are poor in several ways and that mobility viewed in terms of multi-dimensional ill being, is less dynamic than income mobility [3]. Chronic poverty, therefore, can be interpreted as continuous incapacity of individuals and households to govern their livelihood and life. Thus, it brings into play all those agencies that try to influence individual's livelihood and life. In order to construct a conceptual frame to understand poverty,

interaction between individuals, community and state has to be placed within the context of the life pursuit of individuals.

Human beings as we are, are nothing but a bundle of desires, satisfaction of which constitutes the basis of our existence. But we need to be aware that wealth is not the good we seek for, wealth is merely a means to some other end; and the other end is to attain larger good of community [4]. However, when our means become our ends, argues Roy (1985), fulfilling our ordinary life needs of acquiring riches, power and prestige becomes an end in themselves [5]. This obscures the distinction of acquiring riches, by any means, even at the cost of equity. Community, in the process, emerges simply as an arena that is treated by individuals as a potential means of realising their self-interest. It results in individuals losing moral rationale for their actions. This moral disorder symbolises private morality taking paramount position superseding and eroding public morality. The erosion of public morality makes it necessary for the public realm to have a focal point that represents the collectivisation of individual wills. The state serves as the centre, and soon the state assumes omnipotent and sacrosanct authority that translates individuals' beliefs from the realm of idea to reality. Despite the rhetoric of equal opportunities and efforts to redistribute assets, the failure of state brings disappointment as well as increasing dependence on state. The growing dependence on state allows the state *suo motto* to infringe on individual's life. The civil society almost becomes the extended arm of the state, and development initiatives become highly distorted; state treats the communities located at micro-level indistinguishable from each other denying them micro-variability.

Let us construct a micro-community situated in this scenario of economy and polity, located in a remote rural area. Its remoteness is absolute in terms of access to technology, markets, state, civil amenities and politics. Presence of state is only felt when it requires community's resources for involuntary resource transfer [6]. It is a self-sustaining economy where capital -- physical, natural, financial, human and social – is unequally distributed, owing to historical [7] exigencies as well as contemporary shocks [8]. Livelihood in this economy is agriculture-based with a section of population depending on labouring outside the local economy. More often, it is not the improved efficiency due to commercialisation that allows some of the workforce to seek employment outside; rather it is sheer survival needs that force some of the vulnerable sections to seek such an option. Those few with some skills and education would have access to service sector employment and be well-to-do in the economy. Technology adoption varies in the economy; those with some irrigation can adapt the seed-fertiliser technology available from outside. Agricultural income is assured on such farms and they also have a capacity to overcome shocks easily compared to the rest. But those who are resource poor have to develop a coping strategy to face these shocks [9].

Shocks have a number of simultaneous and sequential repercussions that disrupt the economy of the affected households. A shock demands liquid cash to face the crisis at the cost of land resources and results in fall in crop production. A fall in crop production, however, directly reduces households' income and availability of food for consumption. While the current income is reduced, the need for cash to purchase food increases. The households in such situations make various adjustments to minimise the impact of the shock. These include reduction in the use of purchased inputs, selling of milch animals, reducing household expenditure, working as wage labour, borrowing for consumption, and migration of some family members. It is hypothesised that households with (a) higher agricultural income, (b) access to additional purchasing power through agricultural labour, service and casual labour work, (c) milk production, (d) creditworthiness, and (e) larger out-migration shall cope with the shock more easily without having severe impact on their consumption levels[10]. It can also be argued that seasonal migration

of unskilled labour in tribal areas is the most striking form of adjustment mechanism to cope with land constraints [11].

Analysis of migration suggests that if a household's food intake during normal situation is met from the available food stock, migration as a strategy is voluntary. Seasonal migration is a group phenomenon, taken by the household as a whole, perhaps even by several households together. The cost of information relating to destination, movement of the group, type of work and wage contract, dwelling at the destination *et cetera* may be shared by households who perceive seasonal migration inevitable for the larger interest of their families. The duration of seasonal migration is controlled by households' shortfall in consumption. As soon as this shortfall is overcome, the migrating members are free to rejoin the family. In fact, among the households in the village, those with some seasonal migration are the ones with relatively higher food intake. In a scarcity situation, it is highly probable that the food intake of the remaining members of migrating households would be higher than that of the members of non-migrating households in the village.

Two important implications of this coping mechanism need to be spelled out. First, an ever-increasing dependence on the mechanism adversely affects the households' access to social amenities, education, health and justice. For, members of the households are outside the community's social networks for a considerable time. As a result, their social, political, civil freedoms are restricted. Large-scale short-term land transactions [12] in the economy, large grown-up population with rudimentary education, poor health status of members of migrating households, violation of human rights at the destination point follow in the train of migrant's income poverty. This means that livelihood struggles under resource constraints not only result in income poverty but also poverty in multiple dimensions. Secondly, the above coping mechanism seems neither driven by an inclination to change -- the so called '*modernity drive*' -- nor driven by the difference in income between place of permanent dwelling and the migration destination [13]. Low wages notwithstanding at the destination, lack of opportunities in the economy also supports this mechanism. Economic surplus, nevertheless, develops if resourceful households resort to this mechanism as a livelihood strategy. Apart from wealth, the coping mechanism also results in giving necessary information on agricultural technology transfer [14]. Pattern of new technology adoption, in this remote economy where state as an extension agent is absent, would credit the arguments that migration for some households is in response to desire for change.

The seasonal migration, as a means of livelihood, is considered a necessary evil at least among the resourceless. This livelihood mechanism does provide sustenance but at the cost of freedom, in a multiple way, to the households. Their lack of freedom lies in their access failure to land and natural capital. But their livelihood struggles force unfreedom on their family members; they live in inhuman conditions at the destination, their access to education severed, their opportunity to develop skills adversely affected and health services and sanitation made poor by any standard; above all, they often have to face abuses. Cumulatively, all these affect adversely their self-esteem. Human development, in this economy, occurs through a process in which households are assisted to invest on development of their family members to achieve good health, education, skill, and quality environment.

The chronic nature of poverty in this economy is not only because the household suffers from multiplicity of unfreedom but also because of high population pressures in a resource-constrained economy. Thus, one not only passes a culture of poverty to next generation but also passes to the next generation highly depleted physical and human resources. The remoteness of this rural economy -- in terms of technology, markets, healthcare and educational services, food security,

state *et cetera* -- though put further constraints, it is not instrumental in creating chronic poverty directly. Geographical remoteness of the economy, however, results technology adaptation extremely difficult[15]. Output, credit and land markets remain underdeveloped and often interlocked; as a result, a shock or insufficient land resource becomes a cause of further depletion of economic assets. Conceptually, a shock or insufficient land resources or transmission of poverty from one generation to other create similar process that brings first income poverty to household followed by other dimensions of poverty. The only difference between the three processes is that in a remote area, multi-dimensional poverty triggers with shock, whereas in the case of resource poor or inter-generational transmission of poverty the process starts without a shock; they are trapped in multidimensional poverty.

In the remote rural areas, the newly acquired political freedom stratifies the community and the governance becomes highly centralised. Economically deprived also experience unfreedom to decide the pattern of development, thus, the cumulative unfreedoms intensify. Leakages increase and gains of development are distributed unevenly. Community's expectation remains unfulfilled and it loses faith in the village democracy or even in the system as a whole. On the other hand, state and market failures in the remote tribal areas encourage community participation in the form of informal institutions like land-man relations and norms governing dispute resolution *et cetera*. Consequently, the reserve of social capital remains high, though dormant (Sah: 2004). Catalytic support from civil society activates social capital, but only in remote areas where economic stratification is low. Transfer of the social capital to political sphere, nonetheless, does not take place, as gains of governance are low and iniquitous. Probability of the social capital to manifest in vicious pattern remains high. Virtuous manifestation of social capital in governance may only be possible if expectations of people and their role in development planning improve. Otherwise, political unfreedom increases and community remains incapacitated.

Conceptually, the livelihood struggles end up creating a vicious circle of multidimensional unfreedom. Disturbing it may appear but the process is difficult to break without massive drive to create new opportunities in the economy. As the representative democracy fails to prevent the creation of such opportunities, the macro processes subsume the micro-variability of the economy; most likely the participatory democracy is a feasible option to safeguard the interests of this closed economy. The participatory democracy has capabilities to convert cumulative Unfreedom to distributive unfreedom; households may remain economically poor but the political and decision-making power still rests, in the process, with the community. The newly acquired political power has a potential to create situations that may prevent further concentration of unfreedom. Prerequisite for this process to succeed is closer interactions between civil society, community and the state. This interaction may not directly influence individuals' access to capital; it nonetheless brings attitudinal changes in the bureaucracy and elected representatives on the one hand, and developing better understanding of community's rights on the other. This engenders confidence and self-esteem among the marginalised, paving a way for improving the quality as well as their access to political, social and economic infrastructure.

IV. Conclusions

Madhya Pradesh, like rest of India, has experienced the rhetoric of expansion of economic activities and social opportunities. But still the state mirrors the reality of stagnation, economic poverty and social deprivation. Madhya Pradesh ranks 20th among 27 states of the country with respect to its economic performance. The per capita domestic product of the state is lower than national average and much lower in comparison to the better performing states like Punjab, Gujarat and Maharashtra. It has been argued that since a large part of the growth in the economy is because of rapid expansion of employment in service sector, including public administration

that remained confined to well-to-do within the economy, the pattern of growth is unsustainable in influencing well-being of the people. As industrial performance of Madhya Pradesh is indifferent, growth and stagnation in agricultural production is responsible for bulk of the variations in the economic performance of the state. The agricultural sector of the state continues to be less developed, depends upon vagaries of the monsoon and high instability over the years. The indifferent performance of agriculture is not only constraining the over all economic performance of the state, it is also reflected in the levels of social and economic deprivation in the state. The growing instability in the agricultural production and productivity in Madhya Pradesh is attributed to declining capital formation in agricultural sector. The gains of new agricultural technology, owing to investment constrains, have remained confined to only a section of middle size irrigated farmers. On the other hand, labour-replacing inputs did reduce labour absorption in agriculture. This development strategy, evidently, excluded a large mass from economic opportunity in the state. It can be argued that unequal economic opportunities not only constrained access to market and resources to a large section of masses but also resulted in depressing income, wage rate and labour absorption. The final outcome of unequal development is perpetuation of social disparity and lack of public pressures to improve social opportunities.

Health sector investment and its low credibility in Madhya Pradesh is reflected in people's preference to health service providers; about two third of households in Madhya Pradesh prefer to access private health providers for treatment when a family member is ill. Only a third of patients use public health services. Infant and child mortality in the state remains among the highest in India. Most children in the state, irrespective of their social background, have a much higher risk of dying before age one than in the country as a whole. The risk of dying is exceptionally high for children from households with low standard of living, children from scheduled caste and scheduled tribe households, rural children and for children whose mothers are illiterate. Girls, in Madhya Pradesh, are more likely than boys to be underweight or stunted. Under nutrition is particularly high among children of illiterate mothers, scheduled tribe children and households with low standard of living. Madhya Pradesh also reflects serious gender inequality and negligence with respect to female health indicators. A high male-female ratio in the state is indicative of gender bias in the society.

Access to social and economic opportunities also has strong regional variations as well as discrepancies in Madhya Pradesh. What is evident is that though social infrastructure across regions is low and does not vary significantly, a high economic performance of South-western Madhya Pradesh in terms of foodgrains production and farm productivity could not prevent a high incidence of rural poverty in the region. A high incidence of economic poverty with relatively high agricultural performance implies that economic opportunities have not cut across all sections of society. May be the land-based livelihood is unable to influence a large section of the population, and livelihood strategies remain non-land based. The implications of these findings indicate that, poor social infrastructure notwithstanding, dissent and capabilities to pressurise state for improving equitable access to social and economic opportunities may be subsumed in day-to-day livelihood struggles.

Madhya Pradesh with its near feudal agrarian relationship and skewed land holding pattern -- where civil society is conspicuous by its absence in influencing public actions, where move to universalise elementary education have began only a few years back, and where health services and food security has touched only a minuscule of population -- social and economic well-being is low in state agenda. This needs to change. With land unable to sustain a large rural mass, making easy access to land may have been the strategy of social transformation in India, but there is hardly any significant association between land capabilities and social opportunities in Madhya Pradesh. As a hypothesis, therefore, one can argue that having a minimum land entitlement

neither increases economic security nor improves bargaining power, if large mass of the economy is struggling for survival with non-land based livelihood. Would the ground realities change if the people were given opportunity to decide the contents and pattern of development? Would situation change if community participation were institutionalised in planning, implementing and monitoring the programmes that are made to change their lives?

The first step in this direction is to replicate successful water harvesting interventions in remote rural areas to make the agriculture sustainable in normal years. The cushions provided by good agriculture may be able to sustain a few shocks. The second step is to strengthen the borrowing capacity of the masses through group financing for ground water exploitation, creating production-oriented as well as consumption supporting self-help groups that augment institutional finance. The third task is to facilitate process of seasonal migration by reducing the cost of transaction and strengthening support that is traditionally provided by middlemen, like where to go, type of work, wage negotiations *et cetera*. And lastly, providing support to migrants at the destination in terms of childcare, educational facilities, healthcare, drinking water and sanitation, living conditions and subsidised food supply would make the migrants' life less stressful. If these are the few important tasks that are obvious in remote tribal areas to strengthen the coping mechanism of the tribals, evidences show that the state is ill equipped to undertake them. The role of civil society to facilitate the migration as well as restricting it cannot be overemphasised.

Multidimensional poverty is a complex interaction of resourcelessness, livelihood struggles and dishonest use of public funds. The nexus of political elites, bureaucracy and contractor disconnects the poor from development affairs of the village. Access failure to healthcare and education services to the marginalised section perpetually keeps them poor in terms of human capabilities. Multidimensional poverty is also a manifestation of asymmetrical command of resource and decision of their use in the village. Decentralised governance has failed to influence poverty owing to the nefarious nexus that encourages corruption and wasteful use of resources. The socially, economically and politically well-off vigorously try to reach significantly more to outside agencies. Their increasing trust on these agencies is a product of their desire to economically benefit from the newfound association. On the basis of such bridges, the always non-poor and transitory non-poor receive benefits of government schemes. But chronic poor, owing to their inability to bridge, have failed to get economic benefits. It will now be easy to understand why it was that the always non-poor received significantly more proportion in the resource redistribution than what they actually should. The political Unfreedom in the community is evident in the remote rural areas. The blame for this Unfreedom to decide what and how the local development should take place may be surmounted by: (a) initiating a new set of reforms that empower the community to exert pressures for participatory process to begin at the grassroots level; (b) augmenting the quanta of financial allocation in order to meet the demands of the community; (c) introducing second generation of reforms to curb bureaucracy and the elected representatives, at higher echelons, to control the activities and finances of the *Gram Panchayat*; (d) replacing the existing forest laws that obstruct control of commons to be passed to community.

A corollary to decentralisation is to further reforming the education and the health sectors. Poor are excluded from these facilities mainly because such people's participation in the monitoring and management of development is marginal. These systems are under severe bureaucratic control. Management and monitoring of education services has to be made community-centric. The elite healthcare system has no time to hear the voices of the people. There are not only pressing supply side constraints in the health system but also lack of 'the education and information campaign' on planning the family. More than any thing else, it is this faith on

decentralisation that may endow the community with space it deserves in local affairs and preserves equilibrium in unequal power relations.

If community participation is that crucial for PRIs' performance, how to induce participation is worth debating. Indian development experiences have demonstrated that as long as *Panchayats* do not ask community to pay tax -- house tax, electricity charges, business cess, water charges, livestock tax, charge for maintenance of commons *et cetera* -- the community does not ask uncomfortable questions. Therefore, as a strategy, in order to encourage community participation, development should make people stakeholders and create a sense of ownership by asking community to contribute a token cost equitably. This shall force community participation in development. Alternatively, in order to alleviate poverty, it can be argued that a negative income tax should replace the PRIs investment all together. Such a strategy needs to be seen as a safety net for those unfortunate who are trapped in poverty. Negative income tax would transfer resources to most needy at much lower cost compared to the way it is being transferred at present. The strategy is worth pursuing despite the fact that in the era of liberalisation and globalisation, state egalitarian redistribution may be economically inefficient and self-defeating. But the faith that it can break the nefarious nexus and curb corruption provides strength to a policy shift from PRIs to negative income tax.

These are a few ways to strengthen the linkages between agricultural growth and human development in the state that have remained, at best, weak. At the one hand, the growth and economy driven development appears to have contributed only marginally to human development processes. On the other hand, low levels of human development in the state appear to be a major stumbling block in spurring economic growth and economy driven development. The lop-sided development puts a break on human progress.

End Notes

• Professor and Director, MPISSR, Ujjain
Comments on an earlier draft by B.R. Purohit and Yatindra S. Sisodia are gratefully acknowledged. Usual disclaimers apply.

1 This is based on conceptualisation of capabilities by Dreze and Sen A (1989). They have also underlines that under-nourishment may depend not only on her intake of food, but also on her access to health, education, drinking water and sanitary facilities Dreze and Sen A (1995).

2 Using panel data on rural China, Jalan and Ravallion (2000) have explored these issues in four-tier categorisation of income poverty.

3 For those who want to understand extreme poverty, World Bank (2000) has suggested to conceptualise multi-dimensionality of poverty, which depicts the real picture of the poor. For lack of security is absence of one or more factors that enable individuals to assume basic responsibility and to enjoy fundamental nights.

4 Quoting Aristotle, Dreze and Sen (1989) sees it in `the good of human being'. Also, see Roy (1985).

5 However, `to attain the good of the community' is a value that can be embraced consciously; it is also a value that can be served unconsciously without being aware of the fact that one consciously selects it as a guide in life. Individuals do have needs - both ordinary life needs and those related with the pursuit of

higher life purpose. When individuals seek to fulfil ordinary life needs to the total exclusion of the needs to pursue higher life purpose, the trouble of mismatch between the good of one individual and that of all individuals pervade the social order. One can plan for fulfilling the former by action, but one cannot plan for the latter. It depends on the world-view and patterns of thought-ways and work-ways grounded in it.

6 Since the community has little voice, state interventions in the form of land acquisition for large dams is painful to the community, see Chapter 3 Sah and Shah (2004) for details.

7 See Chapter 3, Sah and Shah (2003) for the historical process of resourcelessness.

8 In the form of crop failure, sickness, son's marriage and death in the family or sudden cash needs. These shocks. more often than not, result in indebtedness and depletion of physical capital.

9 Their remoteness to administration and media do create situations where their income poverty has little public glare and sympathy. As a result, their misery does not attract out side resources and support to meet the crisis.

10 Studies on involuntary migration by Sah (1997; 1988; 1999) have shown that this mechanism is the only way the affected family fight shocks.

11 Rapid population growth in a traditional technology driven economy increases fragmentation of holdings and force intensive but unsustainable land use pattern (Bilsborrow: 1992). Shocks like droughts and crop failure also result in land constraints (Breman: 1985, Sah: 1999). These forms of land constraints usually result in seasonal migration.

12 While compared to non-tribal Gujarat, incidence of leasing out land in relocated villages is three to four times higher. Preliminary findings of a study on short term land transaction reveal that 75 per cent of such leasing out on sharecropping basis thereby the tenant bears all the cost including labour and the produce is shared between the landlord and tenant on a 50:50 per cent to 67:33 per cent basis. Over 70 per cent of such contracts are due to constraints like inadequate availability of capital labour and bullocks whereas the rest are owing to land related problems like low productivity (Sah: 1999).

13 The first argument proposes that migration may be motivated by a desire to seek skill and leads to development through a process of migration lead to urbanisation leading to socio-economic development which ultimately result in overall development of the area (Saxena et. al.: 1977). The second proposition put forward by Todaro (1980; 1969) argues that inclination to migrate is determined by the difference in the income between source and destination of migration, and may result in equating expected income.

14 See Chapter 3, Sah and Shah (2003) for details.

15 Available new seed-fertiliser technology has not been created for this economy for, situation in the mainstream agriculture are immensely different than this economy. Therefore, the technology transfer will be risky and adopted on selected farms (See, Sah: 2004, for details).

References

Acharya S, (2003), 'Access to Primary Education', in eds., Govinda R and Diwan R, *Community Participation and Empowerment in Primary Education*, Sage Publications, New Delhi.

Bhalla G.S and Alagh Y, (1979), *Performance of Indian Agriculture*, Sterling Publications, New Delhi.

Bhalla G.S, and Singh Gurmail, (2001), *Indian Agriculture: Four Decades of Development*, Sage Publications, New Delhi.

Bhalla S, (1987), ` Trends in Employment in Indian Agriculture, *Indian Journal of Agricultural Economics*, Vol. 42.

Chaurasia AR (1999) White paper on higher education in Madhya Pradesh. Bhopal, Government of Madhya Pradesh, Department of Higher Education.

Fei JCH, Ranis G, Stewart F (1985) Towards viable balanced growth strategies: A locational perspective. Paper prepared for United Nations Industrial Development Organization.

Govinda R., (2003), Dynamics in Decentralised Management in Primary Education, in eds., Govinda R and Diwan R, *Community Participation and Empowerment in Primary Education*, Sage Publications, New Delhi.

Government of India (1985) SRS Based Abridged Life-tables 1976-80.
Government of India, Ministry of Home Affairs, Office of the Registrar General. Occasional Paper No. 1 of 1985.

Government of India (2002) National Human Development Report 2001.
New Delhi, Government of India, Planning Commission.

Government of India (2005) SRS Based Abridged Life Tables 1998-2002.
New Delhi Government of India, Office of the Registrar General.
SRS Analytical Studies Report No. 1 of 1985.

Government of Madhya Pradesh (no date) District wise Development Indicators of Madhya Pradesh 1980-81 through 1983-84. Bhopal, Government of Madhya Pradesh Directorate of Economics and Statistics.

Government of Madhya Pradesh (1995) Estimates of State Domestic Product of Madhya Pradesh 1980-81 to 1993-94. Bhopal, Government of Madhya Pradesh, Directorate of Economics and Statistics.

Government of Madhya Pradesh (1995) Madhya Pradesh Human Development Report 1995. Bhopal, Government of Madhya Pradesh, Department of Institutional Finance.

Government of Madhya Pradesh (1998) Madhya Pradesh Human Development Report 1998. Bhopal, Government of Madhya Pradesh, Department of Institutional Finance.

Government of Madhya Pradesh (2002) The Madhya Pradesh Human Development Report 2002. Bhopal, Government of Madhya Pradesh.

Government of Madhya Pradesh (2003) Estimates of State Domestic Product of Madhya Pradesh 1993-94 to 2001-02. Bhopal, Government of Madhya Pradesh, Directorate of Economics and Statistics.

Government of Madhya Pradesh (2003) District wise Social and Economic Development Indicators of Madhya Pradesh 1998-99 and 1999-2000. Bhopal, Government of Madhya Pradesh, Directorate of Economics and Statistics.

Hulme D, McKay A (2005) Identifying and measuring chronic poverty: Beyond monetary measures. Paper presented in the International Conference on The Many Dimensions of Poverty Brasilia Brazil.

Kawadia G, (2001), `Economic Growth and Structural Change in M.P. Economy', in eds., Kawadia G, *Development Dynamics of a Backward Economy*, Shree Sunit Prakashan, Indore.

Krishna Anirudh, (2003), 'Falling into Poverty in High Growth State: Escaping Poverty and Becoming Poor in Gujarat', Economic and Political Weekly, Vol. 38 (49).

Kumar G, (2003), 'Promoting Public-Private Partnership in Health Services', *Economic and Political Weekly*, July 19.

Mehrotra PK, Chaurasia AR (2001) Population and social development: Higher and technical education in India. In K Srinivasan and M Vlasoff (eds) Population and Development Nexus in India: Challenges for the New Millennium. New Delhi, Tata McGraw Hill Publishing Company.

Minocha , (2001), `Madhya Pradesh Economy: An Overview', in eds., Kawadia G, *Development Dynamics of a Backward Economy*, Shree Sunit Prakashan, Indore.

National Institute of Rural Development (1999) India Rural Development Report. Hyderabad, National Institute of Rural Development.

NCAS, (2002), *Land and Life: Promises and Performance of Land Reforms in Madhya Pradesh*, National Centre for Advocacy Studies, Pune.

Noronha A, (2003), 'Community in Charge: Shades of Experiences from Madhya Pradesh', in eds., Govinda R and Diwan R, *Community Participation and Empowerment in Primary Education*, Sage Publications, New Delhi

Rao C.H.H, Roy S.K and Subbarao K, (1988), *Unstable Agriculture and Droughts*, Vikas, New Delhi.

Rao J. M, (1994), `Agricultural Development under State Planning', in eds., Byres T.J, *The State and Agricultural Planning in India*, Oxford University Press, Delhi.

Rao J. M and Storm S, (1998), `Distribution of Growth in Indian Agriculture, in eds., Byres T.J, *The Indian Economy: the Major Debates since Independence*, Oxford University Press, Delhi.

Sah D.C, (1999), `Pressure on Land, Employment and Migration', Review of Development and Change, Vol. 4 (2).

Sah D.C, (2004) `Livelihood Struggles: Agriculture in Tribal Gujarat', in eds., Sah D.C and Sisodia Y. S., Tribal Issues in India, Rawat Publications, Jaipur.

Sah D.C, (2004a), `Markets and Democratic Decentralisation', *Indian Social Science review*, Vol. 6 (1), January-June.
Sah D.C. and Shah Amita, (2003), `Chronic Poverty in Remote Rural Areas of Southwestern Madhya Pradesh', (mimeo), MPISSR, Ujjain and GIDR, Ahmedabad.
Sah D.C and Bhatt A, (2004), An In-depth Study of Chronic Poverty: Evidence from Southwestern Madhya Pradesh, (mimeo), MPISSR, Ujjain.
Sah D.C. and Chaurasia Alok R., (2005), 'Growth and Development Linkages in Madhya Pradesh', MPISSR (mimeo).
Sen AK (1984) Rights and capabilities. In AK Sen (ed) Resources, Values and Development. Cambridge MA, Harvard University Press.
Sen AK (1985) Commodities and Capabilities. Oxford, Elsevier Science Publishers.
Sen AK (1990) Development as capability expansion.
Sen AK (1999) Development as Freedom. Oxford, Oxford University Press.
Streeten P, Burki SJ, Haq M, Hicks N, Stewart F (1981) First Thing First: Meeting Basic Needs in the Developing Countries. New York, Oxford University Press.
United Nations Development Programme (1991) Human Development Report 1991. Oxford, Oxford University Press.
Vaidyanathan A, (1988), *Indian agricultural Development in a Regional Perspective*, Orient Longman, Calcutta.
Vaidyanathan A and Nair P.R.G., (2003), 'Introduction', in eds., Govinda R and Diwan R, *Community Participation and Empowerment in Primary Education*, Sage Publications, New Delhi.
Verma Vinod (1997), *Reference Madhya Pradesh 1996-97*, Deshbhandhu Publication Division, Raipur.

AGRICULURAL GROWTH IN UTTAR PRADESH
STATUS – PROBLEMS – POSSIBLE REMEDIES

By

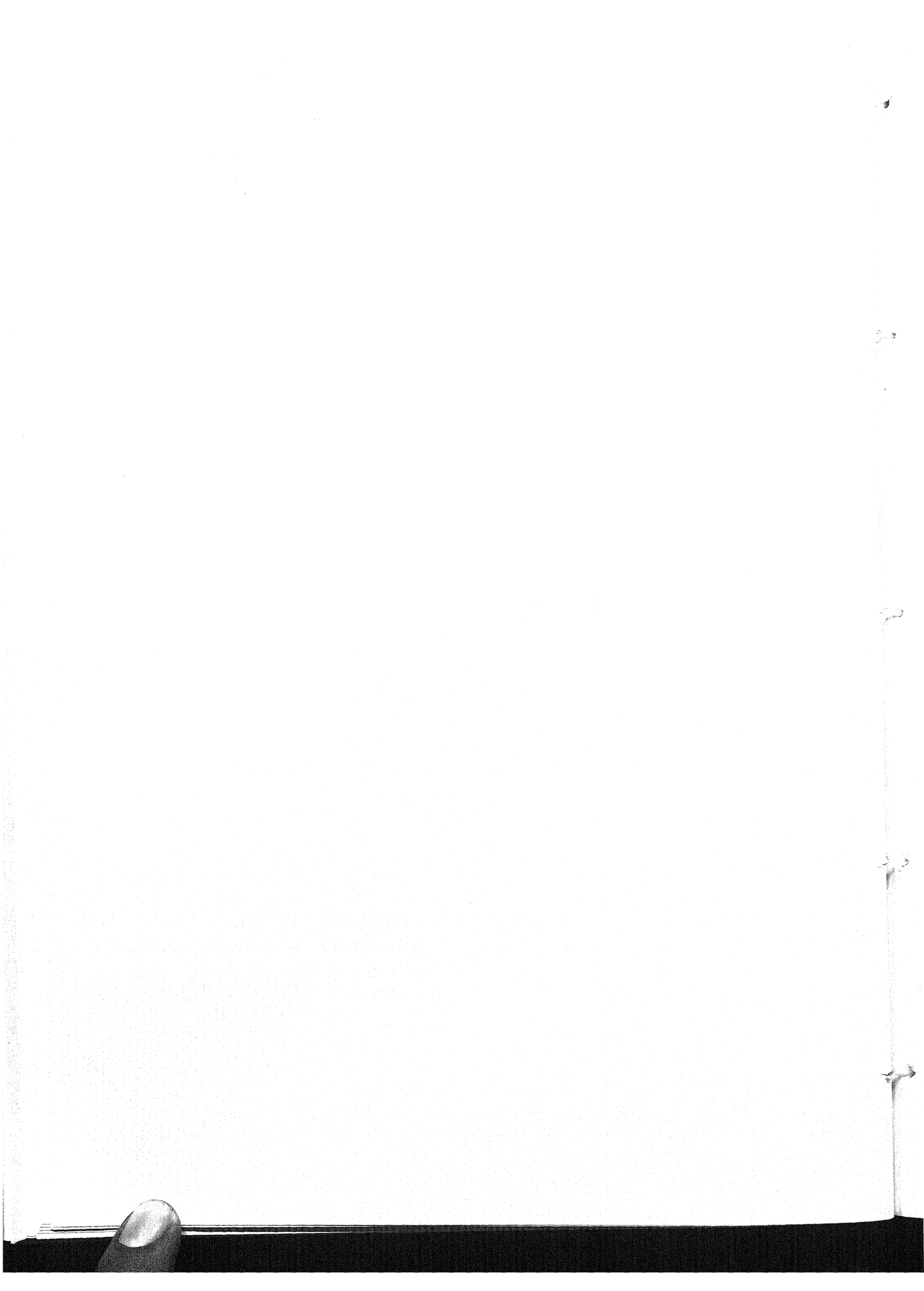
V.W. AMBEKAR

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



AGRICULTURAL GROWTH IN UTTAR PRADESH STATUS – PROBLEMS – POSSIBLE REMEDIES

By :
V.W. Ambekar
Ex-Director of Agriculture

Agriculture in U.P. – Present Status

Uttar Pradesh is predominantly having Agricultural based economy having around thirty three percent contribution to gross state domestic product (GSDP) compared to around twenty two percent in the Countries Gross Domestic Product. The State of Uttar Pradesh contributes about twenty two percent in foodgrain production which is highest amongst the states. In case of wheat, sugarcane and potato production states, production is highest in the country amongst all the states. It is second best in production of pulses. In fruits, vegetables and milk production also the state stands at much higher level compared to other states of the country.

However, at the productivity front, in most of the crops, the state stands at much lower position. In case of rice, wheat and sugarcane the productivity level compared to the states of Punjab, Hariyana, Tamil Nadu and Maharashtra given in Table at Annexure-1 indicates that the productivity levels of these states compared to U.P. State is much higher. If these gaps are reduced even by half, the State's contribution to production can be considerably increased. Keeping in view the large areas under these crops i.e. rice and wheat in Uttar Pradesh which is grown in around 150 Lac Hectares. A meager five quintals increase in productivity in these two crops will add seventy five lac metric tons to production of foodgrains.

Why Low Productivity

When we analyse the reasons for low productivity, the following issues needs consideration :

(1) **Area irrigated** – If we compared the area irrigated, it is clear that Punjab and Hariyana percentage of net area irrigated to net cultivated area it is 92.9 and

---

[1] *Proper presented at Seminar organized by Giri Institute of Development Studies from 27 to 29 March, 2006 on National Seminar on "Agricultural Growth in Post Reform Period" Regional prospective.*

76.8 percent respectively as against Uttar Pradesh 68.6 percent. Moreover, the major irrigation systems in Uttar Pradesh are run of the river system depending upon the status of rainfall. The availability of water is not as per requirement of crops.

(2) **Consumption of fertilizer** – Per hectare fertilizer consumption in U.P. is 126.5/ Kg. per hectare whereas in Punjab and Hariyana it is 174.99, 152.79 Kg. per hectare respectively. The position of consumption of fertilizer in different state is given in Annexure –II.

(3) **Consumption of electricity** for agriculture is 19.76 percent in U.P. against total consumption which is also at a lower level in this State compared to Punjab and Hariyana where it is 28.34 and 42.76 percent respectively. This has a big impact on cost of production. Most of the shallow tubewells in U.P. are run by diesel engines.

(4) **Credit** – In U.P. the credit intake from cooperatives, commercial and rural banks is also at a low level compared to the size of the states with that of Punjab and Hariyana. Though the latest figures are not available but the credit figures in 1998-99 indicates that Hariyana and Punjab utilized Rs. 188871 lac and Rs. 197730 lacs respectively against Rs. 115268 Lacs by U.P. Per hectare credit intake in different states is given in Annexure-III.

(5) **Problematic areas** – The state of U.P. has got around 135 Lac hectares land under different types of degradation such as, sodic/salt affected soils, waterlogged areas, ravine lands, eroded lands, diyara lands etc. Because of these problems, the productivity in areas under these problematic lands is very low, which causes low productivity in the state.

(6) **Poor on Farm Water Management** – As indicated earlier, through the state has 67 percent area under irrigation, the efforts regarding on farm Water Management front are very poor. Though the command area development

programme has been introduced in early s eventees, however, the activities remained confined to only construction of water channels (guls).

(7) **Rainfed Area** – Around 33 percent area in the state is under rainfed condition. In these areas soil and water conservation and watershed development activities are in operation. However, due to lack of peoples participation and non-owning of the programmes by the beneficiaries to the desired extent, full benefits have not accrued. Earlier these programmes were limited to taking up infrastructural development activities like bunding, leveling, check dams, gully plugs etc. The production improvement activities were not pushed up. This has resulted in poor returns against the investments.

(8) **Fragmented Holdings** – The state of U.P. has around 74 percent marginal farmers having less than one hectare land and 15 percent small farmers with less than 2 hectares of land. This percentage compared to other states and the country is much higher with the result that the farmers are doing substantiate farming and most of the farm households are partially engaged in agriculture and these have poor investment and risk taking capacity chart at Annexure-IV shows that the size of holding is going down over the years.

The above are some of the factors which are responsible for poor performance at the productivity level of different crops in U.P.

The above situation hold goods for the entire state. Besides, this further regional analysis also indicates lot of variations in different regions. The table at Annexure-V gives the productivity levels of some of the major crops in different administrative regions i.e. Western, Central, Eastern and Bundelkhand region. Each region has its own problem which also needs to be tackled to bring them at par with each other. Some of the regional problems are as under :

(1) Western U.P. : Soil salinity, alkalinity, ravines.

(2) Central U.P. : Water logging, salt affected soils, soil erosion problem.

(3)	Eastern U.P.	:	Water logging, floods and salt affected soils
(4)	Bundelkhand	:	Lack of irrigation facilities, soil erosion, ravines etc. Moisture stress and undulating topography.

Remedial Measures

(1) In order to address the above mentioned issues, investment in irrigation and power sector needs to be enhanced through public and private sector. Investment in power sector needs to be enhanced so that there is better availability of power to agricultural sector and the available ground water potential is better utilized besides putting up small agro-processing units in the rural sector.

(2) Flow of credit to farm sector needs to be enlarged for which organizing the **Farmers' Interest Groups (FIG's)** on the lines of SHG's is necessary. This will ensure the availability of credit to small and marginal farmers and their dependency to private money lenders with very high rate of interest can be brought down. The farmers groups can be organized on the basis of crops particularly for high value crops.

(3) Encourage Diversification – At present the major thrust is on foodgrain crops and the cereals. This is very much indicated by the percentage of areas under commercial crops and non-commercial crops in U.P. Compared to other states the percentage in U.P. is around 14 percent only. The position of commercial crops in number of States like Maharashtra, Karnataka etc. is much higher.

Through diversification to high value crops and also encouraging Animal Husbandry activities along with vegetables and fruits, the income levels of the farm households can be enhanced. However, for having better backward and forward linkages by forming FIG's, the process of diversification can be accelerated. In fact, introduction of medicinal and aromatic plants also needs to be promoted in the State. In certain areas and specific pockets organic

farming also can be promoted specially from the point of view of enhancing export of organically produced agri-products.

(4) Promotion of on farm Water Management and Watershed Development activities in irrigated and rainfed areas respectively needs to be pursued with people participation and involvement of Panchayat Raj Institutions. However, these programs needs to be pushed on command area basis in irrigated areas with emphasis "On Farm Water Management" and watershed basis in unirrigated areas, for which involvement of all the three tier of Panchayat system i.e. village Panchayat, Khestriya Panchayat and the District Panchayat needs to be ensured with technical support of the concerned line departments. Major thrust should be on peoples participation in order to get full benefits of these programmes. The cost norms for these activities should be need based, rather than fixing arbitrary cost per hectare which is in practice at present.

There should be major emphasis on plantation of fruit trees along with fuel and fodder plant and grasses in both the areas i.e. irrigation command areas and rainfed watershed areas. A systematic approach with full funding support needs to be ensured. In fact, these programmes can be linked with the **employment guarantee schemes** (Act) which should also take up regular maintenance of the assets created under these programmes. This is particularly required for canal and drainage maintenance.

Strong Technology Transfer

At present new approach has been introduced for extension service by establishing ATMA (Agriculture Technology Management Authority) in each district. This should be strengthened and all Govt. sector and private sector and other institutional extension services should be integrated at district level. The KVK's available in each district should be suitably utilized by ATMA to give technical support to technology dissemination. Marketing information and use of latest information technology should be fully utilized. At village level **Agriculture Information and Knowledge Centres** should be established with proper facilities, which can serve the farming community to provide them technical advisory services.

Lab to land programme of the research stations and agricultural universities should be reoriented to farming system and the unit of approach should be **'Farm Household'**. Effort needs to be made to see that the overall income of the 'Farm Household', is increased by providing them guidance in new technologies and market information.

Farmers Interest Group (FIG) be organized to strengthen the farming community. Suitable crop insurance cover also needs to be established with 'Nyaya Panchayat' as base unit for assessing the productivity losses. This will enhance the farmers capacity to take risk and improve his income level.

Enhance Public and Private Sector Investment

In power sector private investment needs to be encouraged to ensure improvement in availability of power to rural area.

There is also a need for larger public investment in irrigation, rural roads and the power sector, which has gone down over the years. In earlier plans major thrust was an these issues but the present investment level is very poor which needs to be enhanced in the larger interest of the farming community.

Irrigation sector needs restructuring and renovation since the present systems are very old and their efficiency has gone down. Moreover, earlier the system was on protective irrigation basis which needs to be converted to productive system by tapping ground water resources and thereby promote conjunctive use of surface and ground water. This will not only provide irrigation water timely and in adequate quantities which is very necessary in enhancing productivity.

References :

1. Agriculture Statistics at a Glance, Ministry of Agriculture, Govt. of India, New Delhi.
2. Tenth Five Year Plan document of U.P.

ANNEXURE – I

COMPARATIVE PRODUCTIVITY LEVEL OF MAJOR CROPS IN UTTAR PRADESH AND OTHER STATES

Sl. No.	Name of the Crop	Productivity in U.P.	Productivity in India	Productivity in other States	
				State	Production
1.	Wheat	27.64	25.53	Punjab	46.96
				Hariyana	41.667
2.	Rice	21.76	19.90	Punjab	33.46
				Tamil Nadu	32.76
				Andhra Pradesh	26.87
				Hariyana	23.86
3.	Sugarcane	573.90	707.80	Tamil Nadu	1057.60
				Karnataka	1011.20
				Maharashtra	900.00
4.	Potato	225.80	186.40	West Bengal	237.10
				Gujarat	220.00

ANNEXURE – II

FERTILIZER CONSUMPTION PER HECTARE

Sl. No.	Name of the State	N	P	K	Total
1.	Punjab	139.46	35.53	2.42	177.41
2.	Hariyana	110.93	28.75	0.66	140.78
3.	Uttar Pradesh	94.90	21.62	3.34	119.86
4.	Andhra Pradesh	98.46	42.97	12.51	15.94
5.	India	60.86	22.04	7.14	90.04

ANNEXURE – III

PER HECTARE CREDIT UTILIZATION IN DIFFERENT STATES

Sl. No.	Name of the State	Per Hectare Credit in Rs.
1.	Hariyana	2130.00
2.	Punjab	3042.00
3.	Uttar Pradesh	933.00

ANNEXURE – IV

SIZE OF HOLDINGS IN UTTAR PRADESH
1990 – 1991 and 1995 – 1996

Sl. No.	Year	Size of Holding	No. in	%	Total Area in Lac Hectare	%	Average Size of Holding
1.	1995 – 96	Less than 1 hect marginal	162.37	75.41	62.66	33.75	0.39
	1990 – 91		148.19	73.08	56.53	31.40	0.38
2.	1995 – 96	Less then two hect. small	31.35	14.56	44.28	23.85	1.41
	1990 – 91		31.18	15.50	43.91	24.40	1.41
3.	1995 – 96	2 to 4 Hect. Medium	15.85	7.37	43.21	23.27	2.73
	1990 – 91		15.43	7.70	42.06	23.40	2.73
4.	1995 – 96	Above 4 Hect. Large	5.71	2.66	35.53	19.13	10.45
	1990 – 91		5.94	3.00	37.36	20.80	10.45

ANNEXURE – V

PRODUCTIVITY OF DIFFERENT CROPS IN VARIOUS REGIONS OF U.P. 1998 – 99

Quintal Per Hectare

Sl. No.	Name of Crop	Eastern	Western	Central	Bundelkhand	U.P.	India
1.	Foodgrains	18.17	24.05	19.09	12.20	19.61	-
2.	Wheat	26.16	30.28	24.18	20.65	25.51	25.53
3.	Rice	18.40	21.97	19.34	14.50	19.42	19.90
4.	Potato	200.50	250.30	204.05	228.17	228.19	186.40
5.	Sugarcane	465.97	641.11	517.36	469.51	587.96	707.80

LAND, CREDIT, OUTPUT AND INCOME RELATIONSHIP IN AGRICULTURE (A MICRO STUDY OF FAIZABAD DISTRICT IN UTTAR PRADESH)

By

P.K. SINHA
S. KUMAR

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Land, Credit, Output and Income Relationship in Agriculture

(A Micro Study of Faizabad District in Uttar Pradesh)

by

P.K.Sinha* and S. Kumar*

More than 70 per cent of India's population lives in rural areas where the main occupation is agriculture. More so is the case in Uttar Pradesh, one of the largest States of India in terms of size and populace. Agriculture is characterised by small holdings. The average farm size is only 1.57 hectares . About 93 per cent (pc) farmers have land holdings smaller than 4 hectares and they cultivate around 55 per cent of arable land. On the other hand, only 1.6 per cent of farmers have operational land holdings above 10 hectares and they utilise 17.4 per cent of the total cultivated land. Due to diverse agro-climatic conditions in the country in general and Uttar Pradesh in particular, a large number of agricultural crops are produced, which can be broadly classified as Kharif, Rabi and Zaid crops. However, only Rabi and Kharif crops have been taken for the study because the contribution of Zaid being almost negligible.

Agricultural Income is the main source of livelihood of majority people living in the rural area in the Uttar Pradesh. It varies in its distribution among farmers across the sizes of farms which are inversely related with the productivity and hence with per acre agricultural income. The income is positively associated with institutional credit.

An effort has been made to find out the relationships among land, credit, output and income in Uttar Pradesh Agriculture. This study is based on both the primary and secondary data. Primary data have been collected from the randomly selected five blocks of Faizabad district namely-Sohawal, Milkipur, Amaniganj, Rudauli and Tarun. Three hundred ten cultivating households were selected for indepth study and analysis of findings through stratified random sampling. An attempt has been made in this study is to find out per acre income across the sizes of farms and to interlink it with credit, income and productivity. To deal with this objective

* Professor and Lecturer respectively in the Department of Economics and Rural Development, Dr. R.M.L. Avadh University, Faizabad

this study has been divided into three sections. First section deals with cropping intensity, irrigated areas as percentage of Gross Cropped Area (GCA) and per acre credit in different districts of Uttar Pradesh. Characteristics of households, per acre production, product value and revenue productivity and credit will be shown in section second. The third section deals with analysis of findings based on regression analysis.

I

A Macro Perspective of Uttar Pradesh

Uttar Pradesh, one of the largest states consists of seventy districts. The agricultural situation of these districts of Western, Central and Eastern regions in terms of cropping intensity, percentage of irrigated area to gross cropped area and per acre amount of institutional credit has been given in table-1. The cropping intensity is more than one for all districts of Uttar Pradesh. A given land in each district is used for sowing and cultivating more than one crops in an agricultural year (July to June). Cropping intensity is varying across the districts due to variation in land quality and irrigation facility in main. The variations may be attributed to variation in agricultural production across the farm-size. Variations in agricultural production is the main reason for variation in the demend for credit. The relationships among land size, productivity and demand for credit has been studied in details of Faizabad district of Uttar Pradesh with the help of primary data as stated above and presented in the next section.

II

A Micro study: Empirical verification

To find out the agricultural income and productivity across the farm size, a survey was conducted. Characteristics of these households may be seen through table-2. Table presents main features of sample households in terms of area owned, net area operated, percentage irrigation, cropping intensity, family size, working male, working female and earning children. It shows that the number of working male members increases with rise in the farm size while the number of working female and children decreases with rise in the farm size. Similarly, the cropping intensity is inversely related with farm size because GCA decreases with rise in

the farm size. All the characteristics of cultivating households effect the productivity and income across the farm size.

Mainly four Rabi crops are taken for study. **These four crops are - wheat, Gram, Sarso and Masoor.** Per acre production of wheat is much more than any other Rabi crops. Wheat production occupies a major share in Rabi crops. Even Uttar Pradesh shares a significant proportion of India's total Wheat production. However, the production of Wheat crop is not equally distributed across the different Blocks of Faizabad district in Uttar Pradesh. Sarso and Masoor are equally popular. Consumption of Masoor Dal (Pulse) is not very popular in Faizabad district. The relationship between per acre production of Rabi crops, land size and credit has been presented first.

When one moves from marginal to big farmer size, the per acre production of Wheat increased from 12.24 quintal to 13.11 quintal in Sohawal for non-borrowing farmers. The similar trend occurs in Milkipur and Amaniganj. When one moves from marginal to big farm size, the per acre production of Wheat decreases from 14.02 to13.26 quintal in Rudauli Block. The similar trend exists with Tarun Block also. Per acre production of Gram, Sarso and Masoor decreases with every rise in the size of farm. In an average in Faizabad district, the per acre production of wheat decreased from 14.38 quintal for small farm-size to 13.35 quintal for big farm size. **One may conclude that per acre production decreases with rise in the sizes of farms. The** performance of Rabi Crops for non-borrowers has been shown in table-3. It is evident from the same table that as the farm size increases the co-efficient of variation decreases from which one may conclude that farmers having smaller size of land don't have consistency in the production and productivity.

Per acre production of Rabi crops for borrowing farmers decreases with rise in the farm size which shows reverse relationship between farm size and its productivity as shown in table-4. It is pertinent from the same table that the C.V. ratio decreases with rise in the farm size.

When one compares between two cases , one finds that borrowing farmers are able to perform better than those of non-borrowing farmers. Former produces 14.22 quintal wheat per acre while later produce only 13.64 quintal per acre wheat. The similar trend occurs with Gram, Sarso and Masoor. It shows that credit has positive impact on productivity.

Kharif crops in main are Paddy, Sugarcane and Maize as shown in table-5. Per acre production of Sugarcane is much more than other two crops. Per acre production of Sugarcane is 334 quintal while this figure for Paddy is only 22 quintal. The blockwise performance varies marginally. The farm size wise performance of non-borrowing farmers shows that **productivity decreases with rise in the farm size.** Per -acre production of paddy as in average term, decreased from 21.36 quintal for marginal farmers to 21.08 quintal foe large non-borrowing farmers. It shows **inverse relationship between the farm size and per acre production.** The coefficient of Variation decrease with rise in the farm size which shows that consistency in per acre production rises with rise in the farm size. The C.V. ratio of Sugarcane is more than other two Kharif crops.

Per acre production of Paddy is 23 quintal for borrowing farmers while this figure fir non-borrowing is only 21.87 quintal. The similar trend occurs with remaining Kharif crops. The c.v. ratio even in this case of borrowing farmers decreases with rise in the farm size.

The comparative picture shows that credit has a positive impact on the per acre productivity, as discussed above. The productivity per acre decreases with rise in the farm size. It shows relationships among land size, credit and productivity. When number of borrowers increases, the per acre production decreases with rise in the farm size. From it one should not conclude that the number of borrowers should not increase. To enhance the per acre production, the number of borrowers should increase. However, one should bring Spread Effect through increasing the number of borrowers among marginal, medium and small farmers because per acre productivity increases when size of farm decreases.

Even a high production can't ensure high earning to farmers when cost of cultivation increases and selling price of their product decreases. It suggests that to know the purchasing power of farmers, one should know the cost structure of production, product value of their products and hence their earnings. An improvement of earnings may enhance their borrowing capacity and supplier's supplying capacity. Per acre cost of production of both the Kharif and Rabi for both the borrowers and non-borrowers has been dealt with in the next step.

Cost of production is the expenditure occurred in cash plus in kind plus imputed value of family labour. Imputed value of family labour is hidden cost

of production. Imputed value, in general, occurs more for marginal and small farmers and less for big and large farmers. Overall cost of production depends on (a) technology of production, (b) rate of growth of production of different crops in different regions, (c) prices of inputs and outputs, (d) cropping pattern, (e) cropping intensity, (f) size of farms, (g) types of crops and (h) returns to scale and returns to variable factors. In the agricultural sector, technology of production is related with an optimal combination of inputs and outputs, High Yielding Varieties of seeds, thresher, tractors, and so on. Cost of technology is overhead cost of production in the scale of production. Per acre cost of Kharif is more than that of Rabi. There are many reasons of being the high cost of Kharif crops. These are: (a) Kharif crops require more irrigation (water) than that of Rabi crops. (b) Per acre labour requirement for Kharif crops is more than Rabi crops. (c) Per acre need of pesticide and fertilizer are also higher in Kharif than that of Rabi crops. (d) both the cash and kind expenditure for Kharif is higher than Rabi crops. The break-up of per acre cost of production for both the borrowers and non-borrowers has been given in table 7 and 8 respectively.

Per acre cost of production is the highest for sugarcane both in the case of borrowers and non-borrowers. It is Rs. 5510 per acre cost of production of sugarcane in the case of non-borrowers while this figure in the case of borrower is Rs. 5229. The next highest costly crop is Paddy. The cheapest crop is Sarso. **According to cost components, it is advisable to take credit because in the case of borrowing, the per acre cost of production is low. However, when the financial cost is added in the case of borrowing farmers separately because credit has been used as an input, the per acre cost for borrowing farmers becomes more than those of non-borrowing farmers. In this case also it is advised to take credit because it increases productivity more than rise in the cost. Therefore, revenue in case of borrowing farmers is more than non-borrowing farmers despite the high cost.**

Per acre cost of production decreases with rise in the farm size as is evident from table-9. There are various reasons of declining the per acre cost of production with rise in the farm- size. The reasons being : (a) spread effect of cost occurs with rise in the farm size (b) requirement of credit decreases with every rise in the farm size because every increase in the farm size enables farmers to meet their needs from farm products. (c) Imputed value of labour is high for small size of

land. For example, per acre cost of production of Kharif crops decreased from Rs. 3661 for marginal farmers to Rs. 3142 for large farm size. This figure for Rabi crops decreased from Rs. 15oo to Rs. 1226 . The similar trend occurs with cost of production and farm size in different blocka as shown in table. **One can infer that per acre cost of production decreases with rise in the farm size.**

The per acre cost of production for both the borrowing and non-borrowing farmers needs to be compared. The comparative picture shows that per acre cost of production to borrowing farmers is more than those of non-borrowing farmers. It is so because borrowing farmers needs to pay installments, stationary, intermediary and transportation cost to get the borrowed money. For borrowers the per acre cost of production of Kharif crops in Faizabad district is Rs. 4004 and this figure for non-borrowers is Rs. 3402 because in the former case financial cost has been added. One more point may be shown here that C.V. ratio is decreasing with rise in the farm size. The C.V. ratio for borrower is more than those of non- borrowers. It shows that productivity consistency is more with non-borrowing farmers than those of borrowing farmers. The similar result occurs in different blocks as shown in tabl-9 and 10. Now it would be better to know the per acre product value which has been dealt with in the next paragraph.

Per acre product value has been derived by multiplication of product and its price per quintal. Analysis of per acre product value of crops will deal with both the Kharif and Rabi crops separately. Per acre product value of Rabi crops depends on: (a) total production, (b) gross sown area, (c) per quintal selling price of product. Per quintal selling price varies even in same area. Some farmers sell their products directly to Arhatiya or Baniya who visit their farms during crop season. Some farmers sell their products to designated government shop. Government buys farmers' products at price higher than Arhatiya or Baniya. Even then, a large number of farmers sell their products to Arhatiya or Baniya because (a) government is unable to pay cash in time. Sometime it becomes so long that it takes even years to be repaid. (b) Selling to Arhatiya or Baniya needs no transportation cost. (c) Arhatiya or Baniya pays cash in time, even in same season. Generally, big and large farmers are able to bear the cost of selling their products to government agent. Sugarcane, and Maize are main Kharif crops. Per acre product value of these crops varies Block to Block. Farm size to farm size and crop to crop. Sugarcane gives highest per acre product value. Per acre product

value of Kharif crops increases with every rise in the farm size but up to ten acre of farm size and after that it stars declining.

A comparative analysis shows that per acre product value of Kharif is more than that of Rabi crops. There could be various reasons of it. These are : (a) Selling price per quintal Kharif is more than that of Rabi crops (b) per acre production of Kharif is more than that of Rabi. It has been dealt with two cases of non-borrowers and borrowers respectively in table-11 and table-12. Per acre product value of Kharif is more than that of Rabi crops. Per acre product value of Kharif is Rs. 7339 and that of Rabi is Rs. 5480 for non-borrowing farmers in Faizabad district. The highest per acre product value of Kharif is in Amaniganj block and that of Rabi is in Tarun block. The per acre product value of Kharif decreased from Rs. 7227 for marginal farmers to Rs. 7120 for large farmers. The similar trend occurs with Rabi crops. It shows that the per acre product value decreases with rise in the farm size. The C.V. ratio decreases with rise in the farm size.

The similar trend occurs with borrowing farmers. In this case also the per acre product value for Kharif crop is more than that of Rabi crops in Faizabad district. Per acre product value of Kharif is Rs. 8148 while that of Rabi is Rs. 6463. The per acre product value of Kharif increased for borrower from Rs. 7766 for marginal farmers to Rs. 8109 for large farmers. The per acre product value of Rabi crops decreased from Rs. 6760 for marginal farmers to Rs. 6104 for large farmers. The per acre product value of both the Kharif and Rabi crops is the highest in the Tarun block . The C.V. ratio decreases with rise in the farm size.

Now it would be better to find out the per acre income of both the borrowing and non-borrowing farmers.

Per acre income is nothing but the difference between per acre product value and the per acre cost of production. It has been derived for both the borrowing and non-borrowing farmers .

Table-13 deals with non-borrowing farmers. Per acre income to non-borrowing farmer in the Faizabad district is Rs. 4029 (income from Kharif crops is Rs. 4111 and that from Rabi is Rs. 3937 per acre). It shows that per acre income to non-borrowing farmer is more from Rabi crops that those of Kharif crops. This is so because of low per acre cost of production of Rabi crops than those of Kharif crops. Table-14 shows that **per acre income to borrowing farmers is more than**

those of non-borrowing farmers. It further shows that **credit has positive impact on the per acre income to farmers.**

The relationship between farm- size and per acre income is inverse as shown in table-13 and 14. When the farm-size is small, the per-acre income from Kharif is Rs. 4400 and when the farm –size becomes large the per acre income decreases to Rs.3978. The similar trend occurs with Rabi crops. **It infers that there is inverse relationship between farm size and per acre income from agriculture. However, this trend becomes reverse when farm-size is associated with per household income.**

There are many reasons of rising per household income with rise in farm size. These are: (a) Number of farmer's decreases with rise in the farm size. (b) Most efficient technology, in general, is used by big farmers. Use of irrigation facility, modern seeds & fertilizers, HYV seeds and insecticide increases with rise in the farm size. (c) Selling of agricultural products to government agencies at higher price increases with rise in the farm size. It is true that government agencies don't repay in time. Cost of delay repayment can be borne by big farmers but not by small farmers. Small farmers sell their products at cheap price to Baniyas who come to buy these products at their farm itself. Wheat is the major source of income among Rabi crops. Per household income generated by Rabi crops has been shown in table-15. Table-16 also shows that per household income increases with rise in the farm size from Kharif crops.

Earning to farmers is the base of demand for credit. Higher the earnings to the farmers, more the capacity to borrow. It improves viability of both the borrower and supplier of credit. Credibility of supplier increases with rise in earnings to farmers. More secured credit is supplied in this case.

One can see that per household product value of Kharif crops varies according to sizes of farms, types of crops and areas of cultivation. Paddy is the main Kharif crop. Paddy generates highest revenue to farmers in the comparison of other Kharif crops. Maize is the least revenue generating Kharif crop. Big farmers are able to generate more revenue than marginal and small farmers. Higher revenue empowers them to generate high purchasing power. On average Marginal farmers generate Rs. 6500.00 as revenue by Kharif crops while at the same time big farmers are generating Rs. 41, 000.00 as revenue.

III

Analysis of Findings

Through the linear regression analysis an effort has been made to show the impact of per acre cost of production (x_1), per acre income (x_2) and land size (x_3) on per acre demand for credit (y). However, through all these four variables, following equation has been derived for all borrowing farmers.

$$Y = -1236.73 - 0.058\ X_1^{*} + 0.435\ X_2 + 0.979\ X_3 \text{ -------} R^2 = 0.747$$

$$(-1.996) \quad (-1.166) \quad (12.299) \quad (13.699)$$

$$d.f = 207 \quad \text{Adjusted } R^2 = 0.743$$

This OLS analysis shows relationship among land, credit, output and agricultural income. It infers that per acre cost is negatively associated with per acre demand because an increase in cost of production lowers the purchasing power and hence borrowing capacity and hence repaying capacity. Per acre income is positively related with per acre demand for credit. Higher the income more the demand for credit. As the land size increases per acre demand for credit also rises. Both the adjusted R^2 and R^2 are more than fifty per cent and approaching to one. It shows greater degree of fitness. The t-value has been shown in bracket. X_1 is significant at 5 per cent level.

From above one can conclude that there is an inverse relationship between per acre production and farm size. Per acre cost of production decreases with rise in the farm size. Per acre demand for credit increases with rise in the farm size.

Table-1: Cropping Intensity, Percentage irrigation and per –acre credit in Uttar Pradesh

Sl.No.	Districts	Cropping Intensity	% Irrigation as GCA	Per acre Credit (Rs.)
1	Saharanpu	1.5	83.1	15032
2	Meerut	1.5	96.2	9304
3	Baghpat	1.6	99.5	8549
4	Ghjaziabad	1.5	86.5	5557
5	Ghaziabad	1.6	99.2	9659
6	Gautambudh Nagar	1.6	88.5	3341
7	Bulandshahar	1.7	99.0	4863
8	Agra	1.4	80.5	18897
9	Aligarh	1.7	84.5	11656
10	Hathras	1.4	81.2	9742
11	Eitah	1.7	77.8	6801
12	Firozabad	1.5	73.6	13355
123	Mainpuri	1.7	87.2	7058
14	Mathura	1.5	80.5	7077
15	Bareili	1.6	85.6	5558
16	Badayun	1.7	68.6	7838
17	Shahjahanpur	1.7	84.7	3500
18	Pilibhit	1.7	91.9	3870
19	Bijnaur	1.3	78.8	5539
20	Muradabad	1.5	83.6	1539
21	Jyotibhaphule Nagar	1.4	82.5	3851
22	Rampur	1.8	92.0	2906
23	Farrukhabad	1.6	69.6	2255
24	Kannauj	1.6	67.5	4831
25	Eitawa	1.5	72.9	2504
26	Aurayya	1.6	71.5	4442
27	Kanpur Nagar	1.5	71.8	7880
28	Kanpur Dehat	1.4	60.8	1727
29	Allahabad	1.3	30.5	1771
30	Kausambi	1.5	49.2	4422
31	Fatehpur	1.3	61.3	1938
32	Pratapgarh	1.5	76.5	5020
33	Jhansi	1.1	42.7	2499
34	Lalitpur	1.3	52.3	1594
35	Jalaun	1.1	40.9	1948

Table-1(cont): Cropping Intensity, Percentage irrigation and per –acre credit in Uttar Pradesh

Sl.No.	Districts	Cropping Intensity	% Irrigation as GCA	Per- acre Credit (Rs.)
36	Hamirpur	1.1	27.0	1832
37	Mahoba	1.1	38.2	2304
38	Banda	1.2	33.8	1695
39	Chitrakut	1.2	48.5	2849
40	Varanasi	1.6	76.3	2750
41	Chandauli	1.5	63.8	4188
42	Ghazipur	1.5	79.8	1561
43	Jaunpur	1.4	76.5	1644
44	Mirzapur	1.4	63.0	4191
45	St.Rabidas Nagar	1.5	53.5	2741
46	Sonbhadra	1.4	26.4	4795
47	Azamgarh	1.6	70.6	2809
48	Mhow	1.7	72.0	4765
49	Balia	1.6	65.9	7777
50	Gorakhpur	1.5	53.7	5667
51	Maharajganj	1.7	47.2	2807
52	Deoria	1.5	53.9	1725
53	Kushi Nagar	1.4	68.3	2923
54	Basti	1.5	53.2	3306
55	St.Kabir Nagar	1.7	55.7	3965
56	Siddhartha Nagar	1.4	39.2	2708
57	Gonda	1.5	37.7	1204
58	Balrampur	1.3	48.5	1878
59	Bahraich	1.5	25.9	1814
60	Srawasti	1.4	39.5	3909
61	Lucknow	1.5	80.3	16189
62	Unnao	1.5	75.0	4704
63	Raibareili	1.4	81.6	12894
64	Sitapur	1.4	56.0	2721
65	Hardoi	1.5	66.7	2970
66	Khiri	1.4	62.2	5130
67	Faizabad	1.4	86.9	3794
68	Barabanki	1.7	79.6	4941
69	Ambedkar Nagar	1.8	69.5	3573
70	Sultanpur	1.5	64.9	3983

Source:1. Sankhyikiye Diary(1998), State Planning Institute, U.P
2.Krishi Utpadan Karyakram, Krishi Bhawan, Lucknow
3.Rabi Utpadan Karyakram, Krishi Bhawan, Lucknow

Table-2: Characteristics of the Sample households

Description	Category of operational holding (acres)				
	Up to 2.5	2.51 to 5.0	5.01 to 10	Above 10.01	Avg.
1. Borrowers					
Area owned	2.12(53)	3.70(58)	6.88(62)	16.33(35)	6.25(208)
Net area operated	2.39(53)	4.61(58)	7.70(62)	14.73(35)	6.36(208)
Percentage Irrigation	86.13(530	78.42(58)	67.78(62)	51.32(35)	69.92 (208)
Cropping Intensity	203.34(53)	193.05(58)	171.16(62)	153.42(35)	181.24(208)
Family Size	6.23(331)	6.34(368)	7.18(446)	9.25(324)	7.06(1469)
Earning men	1.51980)	1.63(95)	1.69(105)	2.16(76)	1.71(356)
Earning women	0.72(38)	0.56(34)	0.53(33)	0.58(21)	0.61(126)
Earning children	0.08(4)	0.06(4)	0.05(3)	0.03(1)	0.06(12)
2. Non-Borrowers					
Area owned	2.21(43)	3.65(32)	6.93(19)	16.86(8)	6.58 (102)
Net area operated	2.18(43)	4.53(32)	7.27(19)	14.66(8)	6.98 (102)
Percentage Irrigation	51.33(43)	50.38(32)	49.71(19)	48.36(8)	49.86 (102)
Cropping Intensity	198.56(43)	176.21(32)	158.73(19)	157.60(8)	171.85 (102)
Family Size	6(270).27	6.41(205)	7.21(137)	9.16(73)	6.71 (685)
Earning men	1.49(640	1.58(51)	1.59(30)	1.98(16)	1.58 (161)
Earning women	0.73(32)	0.59(19)	0.58(11)	0.57(5)	0.66(67)
Earning children	0.08(4)	0.07(3)	0.05(1)	0.02(1)	0.08(9)
3. All					
Area owned	2.165(96)	3.675(90)	6.90(81)	16.59(43)	6.42 (310)
Net area operated	2.285(96)	4.57(90)	7.48(81)	14.69(43)	6.67 (310)
Percentage Irrigation	68.73(96)	64.4(90)	58.74(81)	49.84(43)	59.90 (310)
Cropping Intensity	200.95(96)	184.63(90)	164.94(81)	155.51(43)	176.50(310)
Family Size	6.25(601)	6.37(573)	7.19(583)	9.205(397)	6.94 (2154)
Earning men	1.5(144)	1.60(145)	1.64(135)	2.07(92)	1.66 (516)
Earning women	0.73(70)	0.57(53)	0.55(44)	0.575(26)	0.66(193)
Earning children	0.08(8)	0.07(7)	0.05(4)	0.04(2)	0.06(21)

Note: The frequency of households/ family/earning members as per description in brackets.

Table-3: Per – Acre Production (quintal) of Rabi Crops for non-borrowers

Farm Size	Crops	Blocks of Faizabad District					Faizabad	C.V. (%)
		Sohawal	Milkipur	Amaniganj	Rudauli	Tarun		
Marginal	Wheat	12.24	12.43	13.69	14.02	13.77	*13.23*	6.26
	Gram	7.80	8.33	8.31	7.94	8.44	*8.16*	3.39
	Sarson	5.56	6.02	5.39	5.28	6.11	*5.67*	6.59
	Masoor	6.09	5.91	5.87	6.06	5.35	*5.85*	5.09
Small	Wheat	13.62	13.95	14.04	15.08	15.23	*14.38*	5.02
	Gram	8.33	8.95	9.04	8.79	9.03	*8.82*	3.35
	Sarson	6.13	6.38	6.33	5.76	6.36	*6.19*	4.22
	Masoor	6.37	6.28	6.19	7.17	6.25	*6.45*	6.30
Medium	Wheat	13.26	13.29	13.56	14.02	13.98	*13.62*	2.67
	Gram	7.04	7.65	8.13	8.11	8.06	*7.80*	5.98
	Sarson	5.63	5.94	5.86	5.02	4.99	*5.48*	8.31
	Masoor	5.63	5.88	5.23	6.04	5.78	*5.71*	5.39
Large	Wheat	13.11	13.18	13.28	13.26	12.91	*13.35*	1.11
	Gram	6.54	6.27	5.98	6.06	7.34	*6.44*	8.52
	Sarson	5.11	5.38	5.27	4.98	4.83	*5.11*	4.30
	Masoor	5.47	5.25	5.01	5.67	4.99	*5.28*	5.57
All	Wheat	13.05	13.21	13.63	14.09	13.97	*13.64*	3.34
	Gram	7.42	7.80	7.86	7.72	8.21	*7.80*	3.64
	Sarson	5.60	5.93	5.71	5.26	5.57	*5.61*	4.33
	Masoor	5.89	5.83	5.57	6.23	5.59	*5.82*	4.61

Table-4: Per – Acre Production (quintal) of Rabi Crops for borrowers

Farm Size	Crops	Blocks of Faizabad District					Faiza-bad	C.V. (%)
		Sohawal	Milkipur	Amaniganj	Rudauli	Tarun		
Marginal	Wheat	13.11	11.46	14.06	13.97	14.12	*13.344*	8.47
	Gram	8.07	9.63	9.58	7.48	9.02	*8.756*	10.85
	Sarson	6.77	7.81	7.07	6.95	7.06	*7.132*	5.57
	Masoor	5,93	6.21	6.49	6.53	6.86	*6.404*	5.10
Small	Wheat	14.02	14.58	15.11	15.49	15.33	*14.906*	4.04
	Gram	10.11	10.05	10.71	9.93	9.81	*10.122*	3.44
	Sarson	8.22	8.53	8.80	7.88	8.05	*8.296*	4.46
	Masoor	7.80	6.98	7.21	8.01	7.08	*7.416*	6.20
Medium	Wheat	13.95	14.01	14.12	15.06	15.13	*14.454*	4.07
	Gram	10.02	9.53	9.41	9.07	9.03	*9.412*	4.27
	Sarson	7.91	8.02	7.95	7.16	7.96	*7.8*	4.61
	Masoor	6.53	6.01	6.83	7.97	6.90	*6.848*	10.49
Large	Wheat	13.44	13.88	13.97	14.71	14.95	*14.19*	4.39
	Gram	9.58	9.06	9.26	8.49	8.56	*8.99*	5.16
	Sarson	7.43	7.67	7.52	6.93	7.07	*7.324*	4.25
	Masoor	6.01	5.97	6.47	7.81	6.25	*6.502*	11.66
All	Wheat	13.63	13.48	14.31	14.807	14.882	*14.22*	4.56
	Gram	9.44	9.56	9.74	8.7425	9.105	*9.32*	4.26
	Sarson	7.58	8.00	7.835	7.23	7.535	*7.638*	3.90
	Masoor	6.56	6.29	6.75	7.58	6.772	*6.792*	7.07

Table-5: Per-Acre Production (quintal) of Kharif Crops for non-borrowers

Farm size	Kharif Crops	Blocks of Faizabad district						
		Sohawal	Milkipur	Amaniganj	Rudauli	Tarun	Faizabad	C.V.
Up to 2.50 acres	Paddy	20.23	21.50	20.94	23.03	21.12	*21.36*	8.47
	Sugarcane	300.24	312.04	301.67	309.45	308.22	*306.32*	10.85
	Maize	8.04	7.94	8.54	8.38	7.82	*8.14*	5.57
2.51 to 5.0 acres	Paddy	22.12	22.19	21.56	25.11	23.18	*22.83*	5.10
	Sugarcane	354.13	361.02	355.11	360.16	358.33	*357.75*	4.04
	Maize	10.19	12.90	11.73	10.36	11.03	*11.24*	3.44
5.01 to 10.0 acres	Paddy	22.03	21.98	21.07	23.33	22.67	*22.21*	4.46
	Sugarcane	342.08	350.05	345.19	346.98	340.05	*344.87*	6.20
	Maize	9.04	10.12	11.05	9.06	10.10	*9.87*	4.07
Above 10.01 acres	Paddy	21.95	20.88	20.23	21.17	21.19	*21.08*	4.27
	Sugarcane	321.66	319.07	329.44	326.99	328.06	*325.04*	4.61
	Maize	8.45	9.43	10.23	8.11	9.21	*9.08*	10.49
All	Paddy	21.58	21.63	20.95	23.16	22.04	*21.87*	4.39
	Sugarcane	329.52	335.54	332.85	335.89	333.66	*333.49*	5.16
	Maize	8.93	10.09	10.38	8.98	9.54	*9.58*	4.25

Table-6: Per-Acre Production (quintal) of Kharif Crops for borrowers

Farm size	Kharif Crops	BLOCKS OF FAIZABAD DISTRICTS					Faizabad	C.V. (%)
		Sohawal	Milkipur	Amaniganj	Rudauli	Tarun		
Up to 2.50 acres	Paddy	20.91	22.28	19.10	25.78	22.03	22.02	11.11
	Sugarcane	316.53	309.58	308.43	307.11	307.06	309.742	1.27
	Maize	8.16	9.03	10.07	9.69	8.54	9.098	8.67
2.51 to 5.0 acres	Paddy	23.44	24.13	23.06	26.46	26.10	24.638	6.30
	Sugarcane	356.03	369.44	370.18	369.74	357.41	366.36	1.47
	Maize	10.96	13.01	11.65	11.50	11.13	11.65	6.94
5.01 to 10.0 acres	Paddy	23.16	23.93	22.95	26.03	25.91	24.396	6.07
	Sugarcane	353.11	361.73	360.03	361.18	351.65	357.54	1.33
	Maize	10.65	12.56	10.51	11.06	10.58	11.072	7.75
Above 10.01 acres	Paddy	22.85	22.45	22.01	25.17	24.43	23.382	5.78
	Sugarcane	332.18	351.01	353.61	358.70	343.33	347.766	2.97
	Maize	9.58	11.13	10.43	10.51	10.48	10.426	5.29
All	Paddy	22.59	23.1975	21.78	25.86	24.6175	23.609	7.23
	Sugarcane	341.71	347.94	348.06	349.18	339.86	345.35	1.77
	Maize	9.83	11.4325	10.66	10.69	10.12	10.56	7.12

Table-7: Breakup of per acre cost (Rs.) of production for non-borrowers

Expenditure Heads	Kharif			Rabi			
	Paddy	Sugarcane	Maize	Wheat	Gram	Sarso	Masoor
1. Fertiliser							
a. DAP	650	900	100	369	-	-	-
b. Urea	100	310	50	60	-	-	-
c. Calcium	200	410	50	150	-	-	-
2. insecticide	300	410	-	150	100	70	125
3. Digging	567	815	100	335	73	80	70
4. Irrigation	150	304	100	60	-	-	-
5. Seeds	400	795	215	320	330	200	215
6. Wages							
a. sowing	400	616	275	341	250	239	225
b. Reaping	300	550	210	390	300	100	118
c. Thresher	200	-	-	205	-	-	-
d. Carrying	212	400	116	292	100	100	118
7. Total	3479	5510	1216	2662	1153	789	871
8. Average	3402			1369			

Table-8: Breakup of per acre cost (Rs.) of production for borrowers

Expenditure Heads	Kharif			Rabi			
	Paddy	Sugarcane	Maize	Wheat	Gram	Sarso	Masoor
1. Fertiliser							
a. DAP	635	913	111	361	-	-	-
b. Urea	111	305	52	52	-	-	-
c. Calcium	185	395	45	146	-	-	-
2. Insecticide	280	380	-	149	110	72	105
3. Digging	572	810	100	341	75	83	73
4. Irrigation	55	60	52	55	-	-	-
5. Seeds	395	813	210	326	280	206	206
6. Wages							
a. sowing	360	618	242	313	260	241	207
b. Reaping	300	535	196	328	305	106	102
c. Thresher	50	-	-	209	-	-	-
d. Carrying	219	400	106	235	112	105	109
7. Total	3162	5229	1114	2515	1142	813	802
8. Average	3168			1318			
9. Financial cost	836			973			
Grand Average	4004			2291			

Table-9: Per acre cost (Rs.) of production for non-borrowers

Farm size	Crops	Sohawal	Milkipur	Amanigan j	Rudauli	Tarun	Faizabad	C.V. (%)
Up to 2.50 acre	Kharif	3723	3636	3671	3617	3658	3661	1.10
	Rabi	1477	1540	1501	1508	1475	1500.2	1.76
	Avg.	2600	2588	2586	2562	2566	2580.4	0.61
2.51 to 5.00 acre	Kharif	3639	3449	3669	3462	3438	3531.4	3.19
	Rabi	1429	1481	1402	1420	1399	1426.2	2.31
	Avg.	2534	2465	2535	2441	2418	2478.6	2.16
5.01 to 10.00 acre	Kharif	3413	3154	3364	3296	3241	3293.6	3.09
	Rabi	1369	1361	1319	1283	1284	1323.2	3.09
	Avg.	2391	2258	2341	2289	2262	2308.2	2.46
Above 10.01 acre	Kharif	3208	3075	3227	3113	3088	3142.2	2.24
	Rabi	1257	1264	1206	1190	1214	1226.2	2.65
	Avg.	2232	2169	2216	2156	2151	2184.8	1.68
All	Kharif	3495	3303	3482	3372	3356	3401.6	2.45
	Rabi	1382	1411	1357	1350	1343	1368.6	2.03
	Avg.	2439	2357	2419	2361	2349	2385	1.71

Table-10: Per-Acre Cost (Rs.) of Production for borrowers

Farm size	Crops	Sohawal	Milki-pur	Amani-ganj	Rudauli	Tarun	Faiza-bad	C.V. (%)
Up to 2.50 acre	Kharif	4198	4016	4086	4001	4273	4114.8	2.86
	Rabi	2476	2388	2305	2283	2408	2372	3.31
	Avg.	3337	3202	3195.5	3142	3340.5	3243.4	2.77
2.51 to 5.00 acre	Kharif	4012	4001	4013	3971	4101	4019.6	1.20
	Rabi	2427	2308	2290	2203	2378	2321.2	3.70
	Avg.	3219.5	3154.5	3151.5	3087	3239.5	3170.4	1.91
5.01 to 10.00 acre	Kharif	3973	3902	3962	3902	4067	3961.2	1.70
	Rabi	2405	2283	2205	2176	2361	2286	4.28
	Avg.	3189	3092.5	3083.5	3039	3214	3123.6	2.38
Above 10.01 acre	Kharif	3877	3993	3942	3790	3999	3920.2	2.23
	Rabi	2276	2165	2036	2090	2357	2184.8	6.03
	Avg.	3076.5	3079	2989	2940	3178	3052.5	3.00
All	Kharif	4015	3978	4001	3916	4110	4004	1.75
	Rabi	2396	2286	2209	2188	2376	2291	4.11
	Avg.	3205.5	3132	3105	3052	3243	3147.5	2.44

Table-11: Per acre product value (Rs.) of crops for non-borrowers

Farm Size	Crops	Blocks of Faizabad districtzz						C.V.
		Sohawal	Milki -pur	Amani -ganj	Rudauli	Tarun	Faiza-bad	
Marginal	Kharif	7175	7519	7403	6913	7129	7227.8	2.94
	Rabi	5568	5797	5596	5204	7138	5860.6	11.37
	Avg.	6371	6658	6499	6058	6138	6344.8	3.50
Small	Kharif	7782	7998	8162	7606	8113	7932.2	2.63
	Rabi	5816	5937	5870	5278	5421	5664.4	4.65
	Avg.	6799	6967	7016	6442	6767	6798.2	2.96
Medium	Kharif	7413	7412	7675	7606	7284	7478	1.90
	Rabi	5730	5435	5576	5226	5325	5458.4	3.27
	Avg.	6571	6523	6625	6416	6304	6487.8	1.76
Large	Kharif	6979	7159	7274	7379	6813	7120.8	2.85
	Rabi	5261	5064	4986	4755	4626	4938.4	4.55
	Avg.	6120	6111	6130	6067	5719	6029.4	2.59
All	Kharif	7337	7522	7628	7376	6834	7339.4	3.72
	Rabi	5593	5558	5507	5115	5627	5480	3.40
	Avg.	6465	6564	6567	6245	6232	6414.6	2.31

Table-12: Per acre product value (Rs.) of crops for borrowers

Farm Size	Crops	Blocks of Faizabad district						C.V.
		Sohawal	Milki -pur	Amani -ganj	Rudauli	Tarun	Faiza -bad	
Mar -ginal	Kharif	7691	7807	8051	7454	7829	7766.4	2.80
	Rabi	6579	6684	6497	6033	8009	6760.4	10.96
	Avg.	7135	7245.5	7274	6743.5	7919	7263.4	5.82
Small	Kharif	8313	8604	8385	8181	8630	8422.6	2.28
	Rabi	6677	6674	6798	6128	6594	6574.2	3.95
	Avg.	7446	7644	7441	7107	8319.5	7591.5	5.93
Med -ium	Kharif	8262	8234	8288	8228	8457	8293.8	1.13
	Rabi	6521	6431	6600	5991	6524	6413.4	3.79
	Avg.	8262	8234	8288	8228	8457	8293.8	1.13
Large	Kharif	7938	8118	8123	8081	8286	8109.2	1.53
	Rabi	6256	6116	6088	5781	6282	6104.6	3.27
	Avg.	7097	7117	7105.5	6931	7284	7106.9	1.75
All	Kharif	8051	8190.75	8211.75	7986	8300.5	8148	1.93
	Rabi	6508.25	6476.25	6495.75	5983.25	6852.25	6463.15	5.49
	Avg.	7485	7560.125	7527.125	7252.375	7994.875	7563.9	3.65

Table-13: Per- acre income (Rs.) to non- borrowing farmers

Farm Size	Crops	Blocks of Faizabad district						C.V.
		Sohawal	Milkipur	Amaniganj	Rudauli	Tarun	Faizabad	
Marginal	Kharif	3452	3883	3732	3296	3471	3566.8	6.61
	Rabi	4091	4257	4095	3696	5663	4360.4	17.35
	Avg.	3771	4070	3913	3496	3572	3764.4	6.29
Small	Kharif	4143	4549	4493	4144	4675	4400.8	5.54
	Rabi	4387	4456	4468	3858	4022	4238.2	6.60
	Avg.	4265	4500	4481	4001	4349	4319.2	4.68
Medium	Kharif	4000	4258	4311	4310	4043	4184.4	3.60
	Rabi	4361	4074	4257	3943	4041	4135.2	4.10
	Avg.	4180	4265	4284	4127	4042	4179.6	2.38
Large	Kharif	3771	4084	4047	4266	3725	3978.6	5.70
	Rabi	4004	3800	3780	3565	3412	3712.2	6.16
	Avg.	3888	3942	3914	3911	3568	3844.6	4.05
All	Kharif	3842	4219	4146	4004	3478	3937.8	7.48
	Rabi	4210	4147	4150	3765	4284	4111.2	4.89
	Avg.	4026	4207	4148	3884	3883	4029.6	3.68

Table-14: Per acre income (Rs.) to borrowing farmers

Farm Size	Crops	Blocks of Faizabad district						C.V.
		Sohawal	Milkipur	Amaniganj	Rudauli	Tarun	Faizabad	
Marginal	Kharif	3493	3791	3965	3453	3556	3651.6	5.99
	Rabi	4103	4296	4192	3750	5601	4388.4	16.13
	Avg.	3798	4043.5	4078.5	3601.5	4578.5	4020	9.14
Small	Kharif	4301	4603	4372	4210	4529	4403	3.67
	Rabi	4250	4366	4508	3925	4216	4253	5.08
	Avg.	2162	2313	2197.5	2116.5	2276	2213	3.65
Medium	Kharif	4289	4332	4326	4326	4390	4332.6	0.83
	Rabi	4116	4148	4395	3815	4163	4127.4	5.00
	Avg.	4202.5	4240	4360.5	4070.5	4276.5	4230	2.52
Large	Kharif	4061	4125	4181	4291	4187	4169	2.04
	Rabi	3980	3951	4052	3611	3925	3903.8	4.36
	Avg.	4020.5	4038	4116.5	3951	4056	4036.4	1.48
All	Kharif	4036	4212.75	4211	4070	4165.5	4139.05	1.97
	Rabi	4066.33	4131.66	4213	3725.33	4563	4139.86	7.26
	Avg.	4051.16	4172.20	4212	3897.66	4364.25	4139.45	4.61

Table-15: Per household Income from Rabi Crops (Rs. '000)

Farm size	Rabi Crops	BLOCKS OF FAIZABAD DISTRICTS					Faiza-bad	C.V.
		Sohawal	Milkipur	Amanigan j	Rudauli	Tarun		
Margi-nal	Wheat	6.26	6.60	6.51	6.86	5.78	*6.70*	6.09
	Gram	1.09	1.38	1.70	1.02	1.28	*1.24*	21.68
	Sarson	0.63	0.42	0.45	0.60	0.35	*0.48*	25.04
Small	Wheat	11.46	14.45	13.57	10.68	15.33	*13.09*	15.06
	Gram	1.26	1.25	1.83	2.01	1.47	*1.56*	21.96
	Sarson	0.85	0.96	0.78	0.79	0.78	*0.8*	9.65
Mediu-m	Wheat	19.06	19.60	23.30	23.88	21.01	*21.37*	10.09
	Gram	1.16	1.55	1.78	1.14	1.94	*1.51*	23.84
	Sarson	1.16	1.47	1.70	1.26	0.91	*1.30*	23.14
Large	Wheat	43.42	49.84	47.92	42.91	45.22	*45.86*	6.46
	Gram	1.75	1.85	1.30	2.20	2.27	*1.87*	20.85
	Sarson	1.29	1.36	0.81	1.38	1.47	*1.26*	20.69
All	Wheat	20.05	22.62	22.82	21.08	21.83	*21.68*	5.27
	Gram	1.31	1.50	1.65	1.59	1.74	*1.56*	10.50
	Sarson	0.98	1.05	0.93	1.00	0.88	*0.97*	6.73

Table-16: Per household Income from Kharif Crops (Rs '000.)

Farm Size	Kharif Crops	BLOCKS OF FAIZABAD DISTRICTS						C.V.
		Sohawal	Milkipur	Amaniganj	Rudauli	Tarun	Faiza-bad	
Marginal	Paddy	9.70	10.77	9.86	9.55	10.18	***9.89***	8.31
	Sugarcane	2.30	2.12	2.26	1.54	1.76	***2.00***	16.60
	Maize	0.14	0.09	0.19	0.40	0.11	***0.18***	69.67
Small	Paddy	19.12	22.15	22.10	19.28	23.36	***21.20***	8.947
	Sugarcane	3.73	3.24	2.64	2.84	1.94	***2.88***	23.25
	Maize	0.69	0.48	0.36	0.37	0.35	***0.45***	32.01
Mediu-m	Paddy	34.06	34.46	40.13	45.92	34.71	***37.85***	13.60
	Sugarcane	3.91	2.63	4.75	1.77	2.96	***3.20***	36.08
	Maize	0.78	0.61	0.83	0.60	0.47	***0.66***	22.14
Large	Paddy	71.62	73.88	72.47	69.86	71.53	***71.87***	2.042
	Sugarcane	3.47	3.59	2.89	4.71	3.92	***3.71***	18.02
	Maize	0.85	0.90	0.40	0.60	0.71	***0.69***	29.19
	Others	-	-	-	-	-	-	-
All	Paddy	33.63	35.31	36.14	35.90	34.94	***35.18***	2.81
	Sugarcane	3.35	2.89	3.13	2.71	2.64	***3.68***	8.03
	Maize	0.61	0.52	0.44	0.49	0.1	***0.49***	39.92

Table-17: Per Acre Credit (Rs.) Demanded in Kharif and Rabi Season

Farm size	Credit agency	Blocks of Faizabad					Avg.
		Sohawal	**Milkipur**	**Amaniganj**	**Rudauli**	**Tarun**	
Up to 2.50 acre	**Inst.**	1500	1200	1210	2153	1223	1457.2
	Non-Inst.	2800	1949	2814	2928	1983	2494.8
2.51 to 5.00 acre	**Inst.**	1739	1612	1857	2894	1558	1932
	Non-Inst.	3213	3070	3464	5107	3075	3577.8
5.01 to 10.00 acre	**Inst.**	4230	3421	2636	4822	2550	3531.8
	Non-Inst.	6126	5662	5351	7252	5497	5977.6
Above 10.00 acre	**Inst.**	4048	2828	2196	3764	2123	2991.8
	Non-Inst.	5829	5000	4095	5725	3796	4889
All	**Inst.**	2879.25	2265.25	1974.75	3408.2	1863.5	2478.2
	Non-Inst.	4482	3920.25	3931	5253	3587.7	4234.8

Reference

Aleem, I, (1990). " Imperfect Information, Screening and the Costs of Informal Lending : A Study of Rural Credit Market in Pakistan ", The World Bank Economic Review, Vol.4, No.3, PP: 329-49

Agarwal, N.L. and Kunwant Singh (1974). " Green Revolution, Capital Credit Requirements of Farmers in Semi – Arid Regions of Rajasthan ", Indian Journal of Agricultural Economics, 29 (1) , PP: 67-75

Acharya and Madnani, 1988; Applied Econometrics for Agricultural Economists, Himanshu Publications, Udaipur.

Bardhan, P.K. and Rudra, A. (1978 0. " Interlinkage of Land, Labour and Credit Relations : An Analysis of Villge Survey Data in East India ", Economic and Political Weekly. Vol. 13. Annual No. , February

Bhaduri, Amit (1973). " Study in Agricultural Backwardness Under Semi-feudalism ", Economic Journal, 83(329), PP: 120-137

Chavan, Pallavi and R. Ramkumar (2002). " Micro Credit and Rural Poverty- An Analysis of Empirical Evidence", Economic and Political Weekly, Vol.XXXVII, No. 10, March-9

Chand, Ramesh (1992). " Agricultural Credit in India : Distributional Disparities and Overdues ", Agricultural Economics Research Review, 5 (2), PP: 176-92

Desai , D.K., 1988; Institutional credit requirements for agricultural production-2000 A.D., Indian Journal of Agricultural Economics, Conference Number, Vol. XLIII, NO. 3, Jul-December.

Desai, B.M. (1978). " Viability and Equity objectives of Institutional Credit for Agriculture ", in Agriculture Finance Paper and proceeding of the Seminar, Junagarh : Gujarat Agricultural University

Dandekar, V.M. (1976), " Limits of Credit, Not Credit Limits", Economic and Political Weekly. 38 (39), September 25, , PP: A-26-95

Gothoskar S.P.(1988). " On Some Estimates of Rural Indebtedness", RBI Occasional Papers, Vol. 9. no. 4, December

Gadgil, M.V. (1986)." Agricultural Credit in India : A Review of performance and Policies ", Indian Journal of Agricultural Economics, 41(3), PP: 282-309

Gadgil, M.V. (1992) . " Future of Institutional Agricultural Credit in India: Likely Impact of Narsimhan

Narayana , D. (1993). " Financial Sector Reforms : Is there strategy for Agricultural Credit?, EPW. Oct.-16. PP: 2253-55

Paul, Samuel, 1970; Investment in Agriculture: A Cost Benefit Analysis, Economic and Political Weekly, Vol.V, No. 20, May-16

Rath, N., 1989; Institutional Credit for Agriculture in India, Journal of Indian School of Political Economy, Vol.I, No. 2, July-December

Reserve Bank of India, 1989; Report of the Agricultural bCredit Review Committee (Chairman: A.M.Khusro), RBI, Bombay, August

Singh, Surjit (1990). " Rural Credit : Issues for thr the Ninties", Economic and Political Weekly, November 17, PP: 2231-34

Tendulkar, Suresh (1983). " Rural Institutional Credit", Indian Economic Review, 18(1), PP: 101-37

Vyas, V.S. (1994) . " Aghricultural Policies for thr Ninties : Issues and Approaches ", Economic and Political Weekly, 29(26). PP: A 54-A 64

WHY HAS AGRICULTURAL GROWTH IN U.P. DECLINED?

By

A.K. SINGH

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

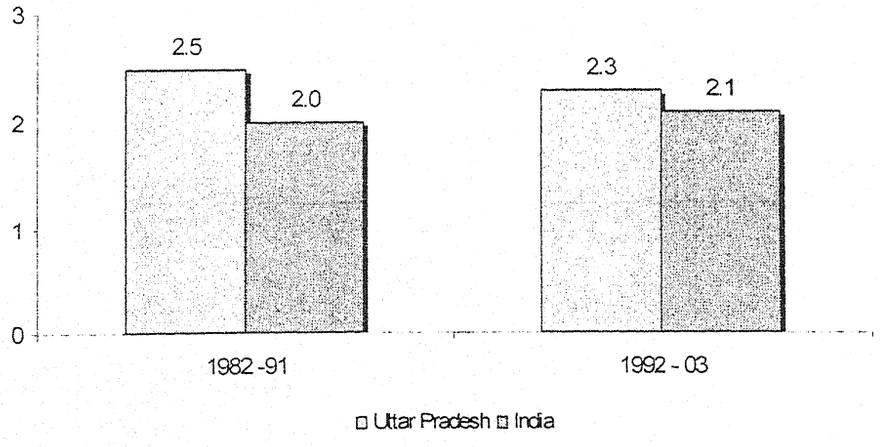
27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

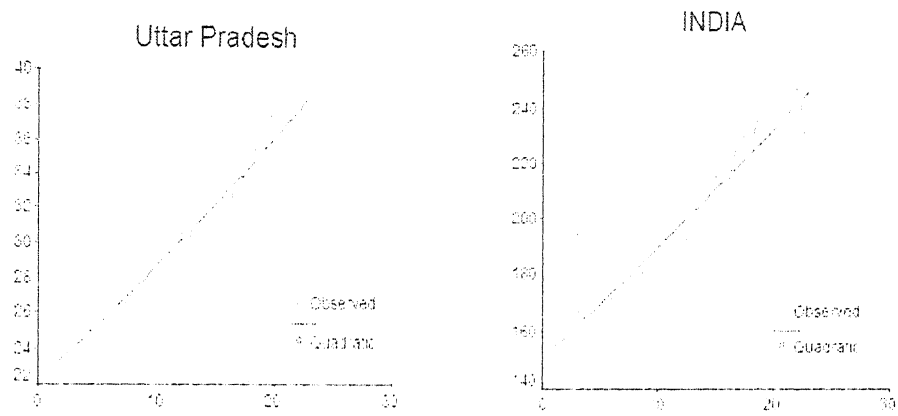
Why Has Agricultural Growth in U.P. Declined?

Ajit Kumar Singh
Director
Giri Institute of Development Studies, Lucknow

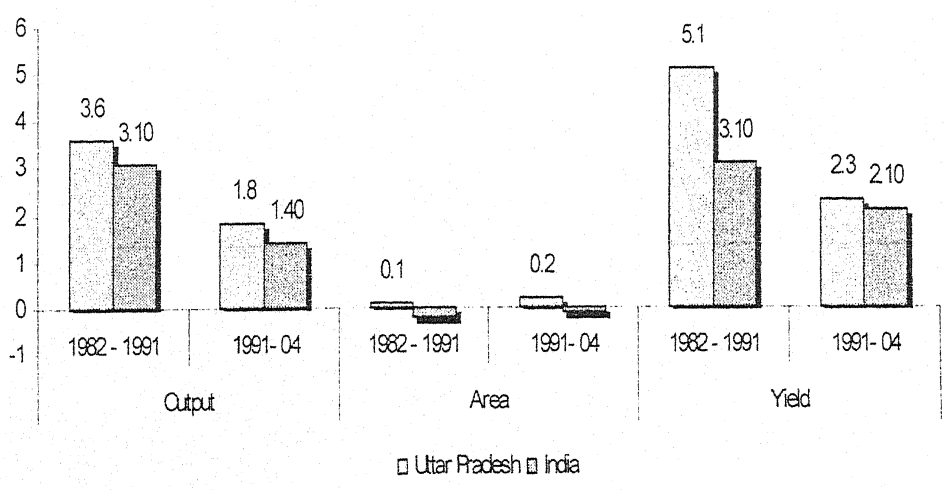
CAGR (%) of Value of Agricultural Output



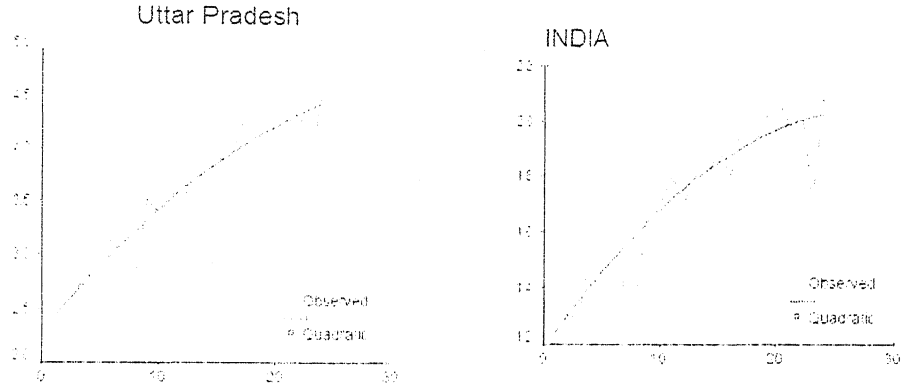
Quadratic Regression on Value of Agricultural Output: 1980-81 to 2001-02



CAGR (%) of Output, Area and Yield of Foodgrains



Estimates of Quadratic Function on Foodgrains Output: 1981-04



CAGR (%) of Output of Different Crops

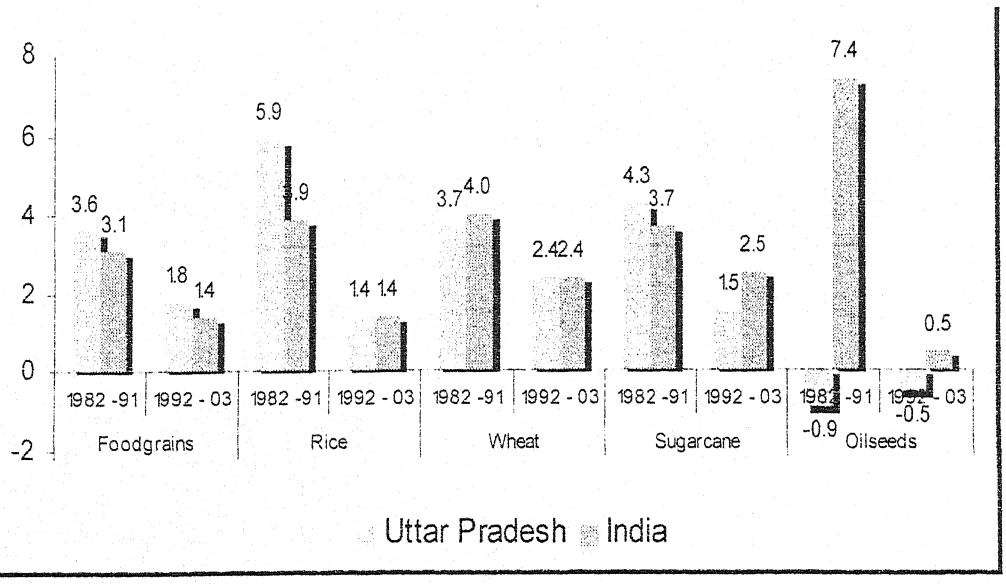
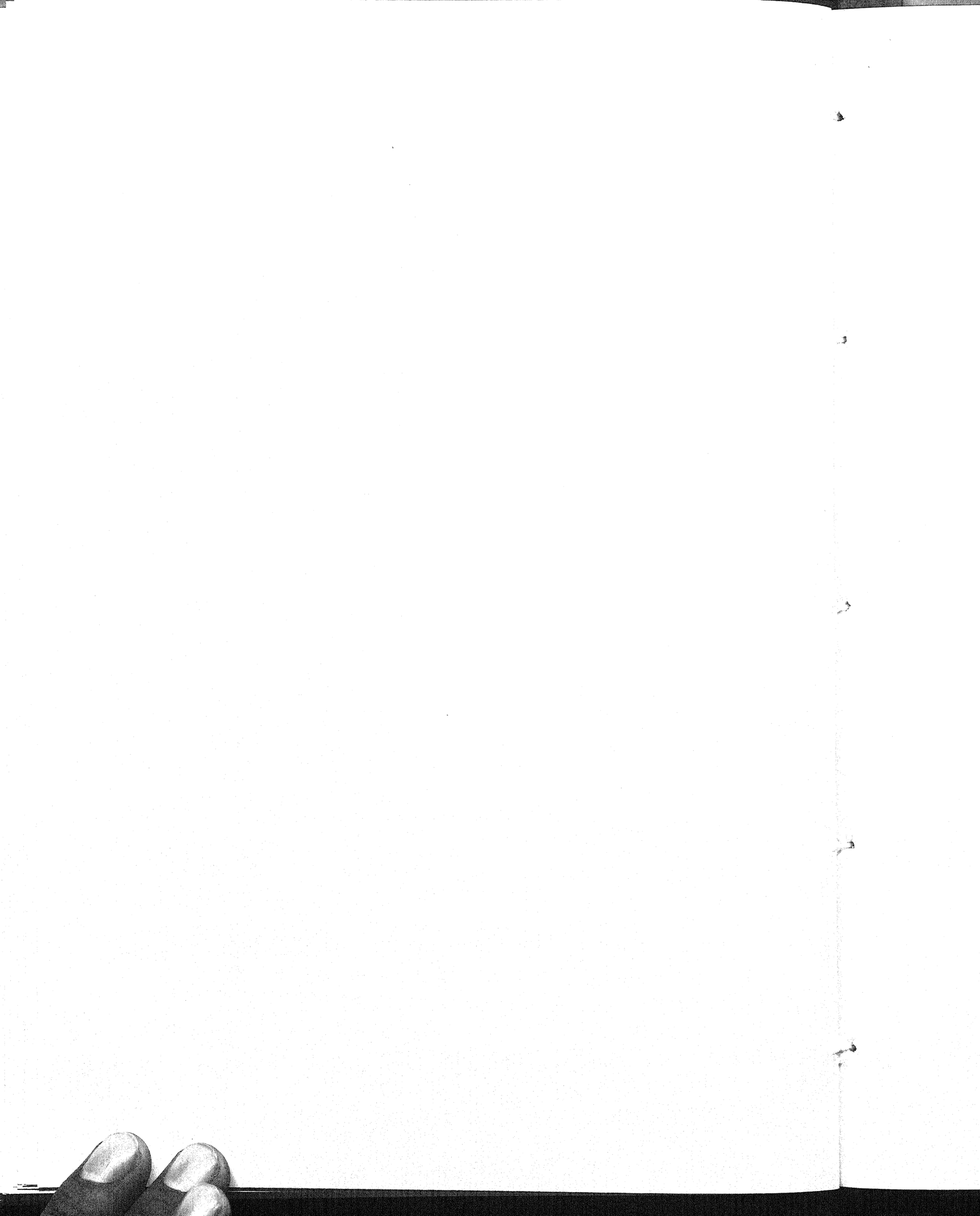


Table 1: CAGR (%) of Agricultural Output in Pre and Post Reform Period: U.P. & India

Crops	1969-85	1984-94	1993--03
Rice	5.7	3.4	1.9
Wheat	6.0	3.0	1.9
Jowar	0.7	-2.1	-4.1
Bajra	0.8	1.2	1.5
Maize	0.2	0.1	-1.9
Barley	-2.3	-1.4	-3.1
Total Cereals	4.5	2.7	1.5
Gram	-1.4	-3.3	-1.8
Arhar	0.7	-3.8	-3.2
Total Pulses	-1.4	-0.8	-0.8
Total Foodgrains	3.6	2.4	1.4
Groundnut	-3.3	0.4	-6.3
Rapeseed & Mustard	9.6	8.7	-3.0
Sugarcane	2.3	4.0	1.2
Potato	9.4	3.3	4.1

Cropwise Compound Growth Rate of Yield in U.P. (% per annum)

Crops	1969-85	1984-94	1993--03
Rice	4.1	3.5	1.2
Wheat	3.0	2.3	1.6
Jowar	1.9	1.7	0.5
Bajra	1.6	3.1	0.8
Maize	1.8	0.9	0.3
Barley	2.6	3.5	2.1
Total Cereals	3.4	2.9	1.6
Gram	1.1	0.3	0.7
Arhar	1.5	-3.8	0.5
Total Pulses	0.5	-0.4	0.0
Total Foodgrains	3.2	2.6	1.6
Groundnut	-0.7	4.1	-2.8
Rapeseed & Mustard	1.7	3.3	0.8
Sugarcane	0.7	2.4	-0.3
Potato	3.5	0.8	3.2

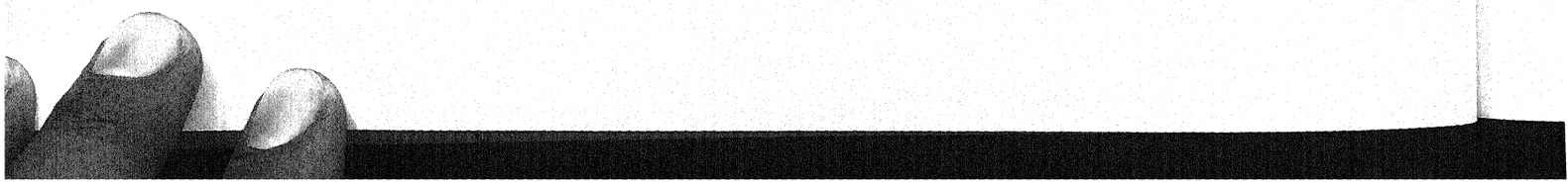


Cropwise Compound Growth Rate of Area in U.P. (% per annum)

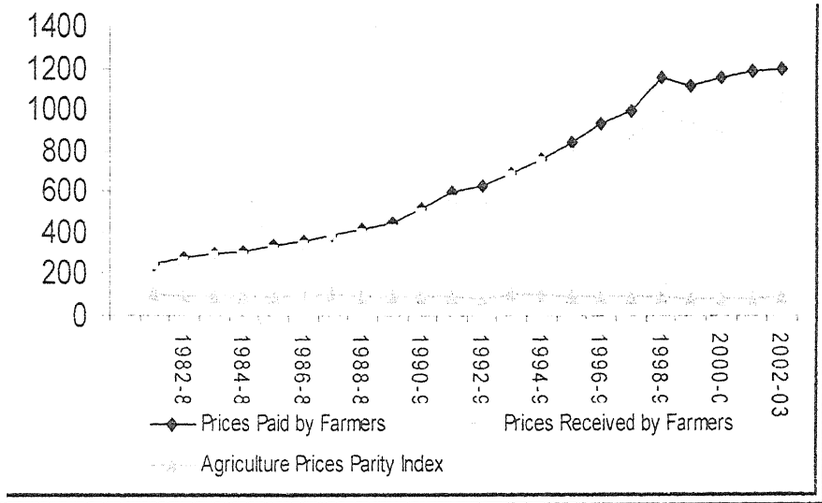
Crops	1969-85	1984-94	1993--03
Rice	1.6	-0.1	0.7
Wheat	2.9	0.8	0.3
Jowar	-0.9	-3.7	-4.6
Bajra	-0.7	-1.8	0.7
Maize	-1.3	-0.8	-2.1
Barley	-3.1	-4.7	-5.1
Total Cereals	1.1	-0.2	-0.1
Gram	-2.0	-3.6	-2.5
Arhar	-0.7	-0.1	-3.7
Total Pulses	-1.7	-0.4	-0.8
Total Foodgrains	0.5	-0.2	-0.2
Groundnut	-2.6	-3.5	-3.6
Rapeseed & Mustard	6.4	5.3	-3.7
Sugarcane	1.3	1.6	1.5
Potato	4.4	2.5	0.9
Total Non-Foodgrains	1.3	1.5	-0.3

Cropwise Compound Growth Rate of Output, Area and Yield in U.P. (% per annum)

	1984-94			1994-03		
Crops	Output	Area	Yield	Output	Area	Yield
Rice	3.4	-0.1	3.5	1.9	0.7	1.2
Wheat	3.0	0.8	2.3	1.9	0.3	1.6
Jowar	-2.1	-3.7	1.7	-4.1	-4.6	0.5
Bajra	1.2	-1.8	3.1	1.5	0.7	0.8
Maize	0.1	-0.8	0.9	-1.9	-2.1	0.3
Barley	-1.4	-4.7	3.5	-3.1	-5.1	2.1
Total Cereals	2.7	-0.2	2.9	1.5	-0.1	1.6
Gram	-3.3	-3.6	0.3	-1.8	-2.5	0.7
Arhar	-3.8	-0.1	-3.8	-3.2	-3.7	0.5
Total Pulses	-0.8	-0.4	-0.4	-0.8	-0.8	0.0
Total Foodgrains	2.4	-0.2	2.6	1.4	-0.2	1.6
Groundnut	0.4	-3.5	4.1	-6.3	-3.6	-2.8
Rapeseed & Mustard	8.7	5.3	3.3	-3.0	-3.7	0.8
Sugarcane	4.0	1.6	2.4	1.2	1.5	-0.3
Potato	3.3	2.5	0.8	4.1	0.9	3.2



Agriculture Price Parity Index in Uttar Pradesh (1970-71=100)



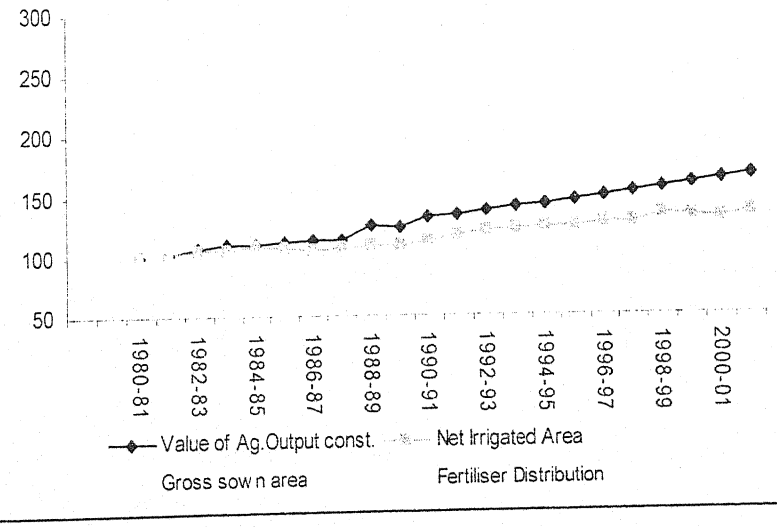
Trends in Agriculture Output and Input in Uttar Pradesh

Year	Foodgrain output (Lakh Tonnes)	Area irrigated (lakh ha.)		Gross sown area (lakh Ha.)	Fertilizer distribution	
		Net	Gross		Total Lakh Tonnes	Per ha. GSA (kg)
1980-81	249.5	94.5	113.7	245.7	11.5	46.8
1981-82	242.9	95.4	116.2	247.7	12.7	51.3
1982-83	265	98.8	121.3	247	14.3	57.9
1983-84	292	98.8	122.5	250.6	16.4	65.4
1984-85	299.2	101.5	127.3	251.2	16.1	64.1
1985-86	314.3	101.3	129.1	252.9	19.7	77.9
1986-87	303	98.5	134.1	251.9	17.7	70.3
1987-88	287	100.4	139.2	244.2	16	65.5
1988-89	354.4	101.7	141.1	252.5	21.4	84.8
1989-90	337.9	102.3	143.6	253.4	20.9	82.5
1990-91	355.2	105.4	147.7	254.8	22.4	87.9
1991-92	355.3	110.5	154.3	252.8	22.5	89
1992-93	362.5	113.2	160	256.8	21.8	84.9
1993-94	372.1	114.6	163.6	254	22.9	90.2
1994-95	388.3	116.7	168.2	254.2	24.8	102.5
1995-96	383.5	117.5	169.7	257.9	26	100.8
1996-97	423.8	120	174.7	261.3	27.6	105.6
1997-98	416.8	120.1	173.2	260.5	30.3	116.3
1998-99	388.2	126.9	177	261.6	30.5	116.6
1999-00	442.6	124.7	175.8	251.2	32.7	130.2
2000-01	427.4	124	176.9	253	29.6	117
2001-02	441.4	126.3	182.2	254.5	32.6	128.1
2002-03	382.8	128.5	177.9	243.1	32.4	133.3

Compound Growth Rate of Major Agricultural Inputs

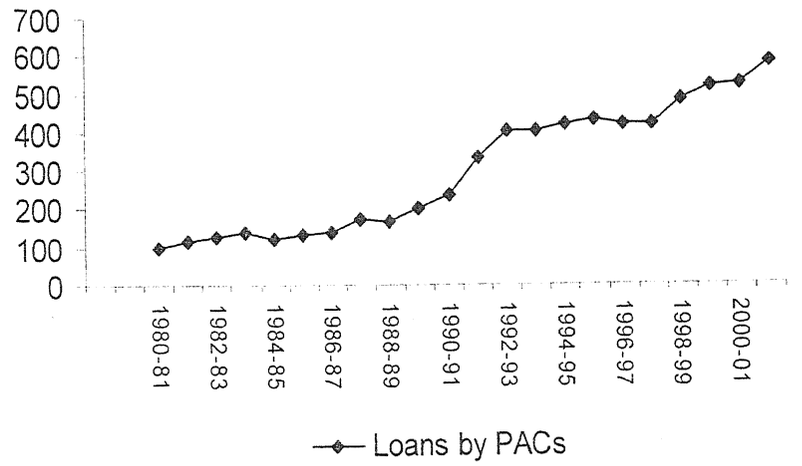
Average for the Period	Foodgrain output	Value of Ag.Output const.	Net Irrigated Area	Gross sown area	Fertiliser Distribution	Loans by PACs
1980-85 over 1975-80	6.1	N.A	2.9	1.0	10.5	N.A
1985-90 over 1980-85	3.5	2.2	0.6	0.2	6.1	7.5
1990-95 over 1985-90	2.8	3.2	2.1	0.3	3.7	15.9
1995-00 over 1990-95	2.3	2.2	1.7	0.3	5.1	2.1
2000-03 over 1995-00	2.1	N.A	1.0	-0.7	2.5	8.1

Index of Agriculture Output and Inputs in Uttar Pradesh (1980-81=100)





Index of Loans By PAC's



Capital Expenditure by Government on Agriculture and Allied Heads at 1980-81 Prices

STATES	Capital Expenditure (Rs crore/year)			Index 1980-90/ 1974-79	Index 1990-97/ 1980-90
	1974-79	1980-90	1990-97		
U.P.	585	1045	899	178.63	86.02
India	4383	6395	5319	145.90	83.17

Source: Ramesh Chand (2000).

CROP DIVERSIFICATION IN UTTAR PRADESH : NEED OF POLICY REORIENTATION

By

FAHIMUDDIN

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

Crop Diversification in Uttar Pradesh: Need of Policy Reorientation*

Dr. Fahimuddin
Giri Institute of Development Studies, Lucknow

I. Introduction:

Uttar Pradesh is predominantly an agricultural state. With a net cultivated area of around 17 million hectares, agriculture in the state employs more than 70 percent of total main workers. The state is the major producer of important agricultural commodities like wheat, rice, sugarcane, vegetables, fruits and milk products. The state produces 35 percent of the country's wheat, 15 percent of rice, 46 percent of sugarcane, 42 percent of potato, and 15 percent vegetable of the whole country's production. The contribution of Agricultural State Domestic Product (ASDP) to Gross State Product (GSP) in Uttar Pradesh was about 32.8 percent during 1999-2000 which was next high only to Punjab, Haryana, Rajasthan and Assam. But despite the dominant role of agriculture in U.P.'s economy in terms of crop production, employment and income generation, its focus basically remained oriented to foodgrain production. The data revealed that in U.P. around 80 percent of gross cropped area was used for foodgrain cultivation by 1999-2000. It is a well known fact that cultivation of foodgrain yields much lower returns as compared to the cultivation of non-foodgrain.

In this scenario, crop diversification in favor of more remunerative and high valued crops has been reckoned as an important strategy to increase the income and employment opportunities to the farmers of the state. In the traditional subsistence farming, agricultural diversification was a coping mechanism to risk aversion. In the Markey led environment; diversification is going to be a strategy

---

*The paper to be presented in the National Seminar on Agricultural Growth in the Post-Reform Period: Regional Perspective, March 27-29, 2006.

To allocate scarce resources optimally, augment farm income, generate employment opportunities, alleviate poverty and conserve precious resources. The 'Agricultural Policy of Uttar Pradesh' has emphasized the need for diversification of existing agriculture towards high value crops and develop appropriate infrastructure to accomplish that. The purpose was stated to be the employment generation and poverty alleviation leading to regional specialization in production of commodities best suited to their respective biophysical endowments and improving the sustainability of soil and water resources. In the era of economic liberalization and WTO, crop diversification in agriculture best suits to the market oriented development strategy being practiced.

The attempt made here confines to the evaluation of pattern of crop diversification achieved during the post-liberalization period in the state of Uttar Pradesh and then suggest some policy modifications, if need emerges.

II. Objectives and Approach:

The primary premise behind the crop diversification is to shift the traditional foodgrain based cropping pattern in favor of non-foodgrain high value crops. To understand such shifts better, it is essential to evaluate:

(a) The extent and speed of crop diversification achieved during post liberalization period.
(b) The key source of crop diversification.
(c) The implications of crop diversification achieved so far in the state of Uttar Pradesh.

As to the methodology of above evaluation, three approaches have been adopted in this paper. First, the crop diversification has been considered on the basis of measure of cash crops area in gross cropped area in 1990-91 and 1999-2000. Second, the analytical framework is based on the shift in area under cash crops in

temporal perspective. Third, the source of crops diversion in agriculture has been examined by analyzing the crop intensification viz. crop substitution. The study is confined to the state of Uttar Pradesh and based on the secondary data published by the Department of Agriculture, Government of Uttar Pradesh. The reference year is 1990-91 (the year since the policy of economic liberalization was started) and 1999-2000 (the year for which latest data are available).

III. Crop Preferences in Different Region:

The crop preferences according to importance in GCA of different regions have been presented in Table-1. It reflects that crop choices varied across different regions. Wheat and rice were the two crops most preferred in every region of the state. Wheat has been found to be the principal crop in Western and Bundelkhand regions, covering more than 25 percent of GCA. The wheat and rice in Central region and rice and wheat in Eastern region were the major crops covering more than 25 percent of GCA.

Table-1: Crop Choices according to their share in GCA of different regions: 1999-2000

Region	High Choice (>25 of GCA)	Medium Choice (10-25 % of GCA)	Low Choice (5-10% of GCA)	Least Choice (<5 % of GCA)
Western	Wheat	Rice, Sugarcane	Pearlmillet, Maize, Rapeseed, Mustard	Barley, Pigeon pea, Other pulses, Oilseed, Fruits and Vegetables.
Central	Wheat, Rice	-----	Maize, Sugarcane	Barley, Sorghum, Pearlmillet, Other pulses, Oilseed, Fruits and Vegetables.
Eastern	Rice, Wheat	-----	Other pulses	Barley, Sorghum, Barley, Sorghum, Pearlmillet, Other pulses, Oilseed, Fruits and Vegetables, Other pulses, Oilseed, Fruits and Vegetables.
Bundelkh and	Wheat	Chickpea, Other Pulses	Sorghum	Barley, Rice, Pearlmillet, Maize, pigeonpea, Oilseeds, Sugarcane, Fruits & Vegetables

The rice and sugarcane in Western region and mainly the pulses in Bundelkhand region were found to be grown on 10-25 percent of their respective GCA. Thus, it reflects that farmers in the state had lower choice for cultivation of non-food crops as compared to food crops and it can be inferred that the agricultural economy of the state had remained highly oriented to the cultivation of traditional crops even after economic reforms.

IV. Status of Crop Diversification:

To what extent crop diversification could happen in Uttar Pradesh and how it varies across different regions can be seen from the following Table-2.

Table-2: Percentage of area under cash crops in GCA of different regions in Uttar Pradesh

Region	Percentage of Cash Crops Area in GCA		Shift During 1990-91 and 1999-2000
	1990-91	1999-2000	
1. Western	33.07	31.65	-1.42
2. Central	18.43	21.12	2.69
3. Eastern	10.50	10.55	0.05
4.Bundelkhand	07.33	08.58	1.25
All U.P.	20.01	20.33	0.32

Source: District-wise Indicators of Development, State Planning Institute, Lucknow.

The above table shows that crop sector in Uttar Pradesh could not develop significant diversification during post-economic reform period. At the regional level, Western region was most diversified during 1990-91 and 1999-2000. However, the shift in area of cash crops during the reference period became negative by 1.42 percent in this region. The Central region was found to be the next most diversified during both the years and the change in cash crops diversification was highest in this region as compared to other four regions and

the state as a whole. The Eastern region was on the third position but the improvement it showed could remain negligible during the period. The Bundelkhand region was least diversified but it showed better diversion in favor of cash crops as compared to the Eastern region and the average of state. On the whole, above analysis revealed that (i) diversification in favor of cash crops in U.P. has been at the low level since the beginning of economic reforms in 1990-91 till 1999-2000; (ii) the growth in crop diversification has not been significant; (iii) the Western region of state which was most diversified among all four regions during both the years experienced the negative growth; and three remaining regions except the Central region did not show a favorable shift for cash crops.

V. Growth in Crop Diversification: District-Wise Analysis:

It has been observed above that the diversification in favor of cash crops in U.P. could not be achieved to an appreciable extent. Let us analyze the situation at the district level. The Compound Rate of Growth (CRG) in the area of cash crops has been calculated in respect of each district at the regional level. The districts have been classified into high (2 percent & above); medium (1-2 percent) and low (below 1 percent) growth districts. The analysis is being presented below:

V.1 Growth in area of cash crops among districts of Western Region:

It is evident from Table-3 that more than half of total twenty (20) districts of the Western region analyzed here showed negative growth in their GCA of cash crops during the reference period. Only two districts namely Gaziabad and Farukkabad showed high level growth while Bulandshahar, Etah and Etawah districts achieved medium level growth. The Saharanpur, Muzaffarnagar, Bijnore and Meerut districts experienced low level growth.

Table-3: Growth in GCA of cash crops in districts of Western Region during 1990-91 and 1999-2000

High Growth (2 percent & above)	Medium Growth (1-2 percent)	Low Growth (below 1 percent)	Negative Growth
1. Gaziabad 2. Farukkabad	1. Bulandshahar 2. Etah 3. Etawah	1. Saharanpur 2 Muzaffarnagar 3. Bijnore 4. Meerut	1. Moradabad 2. Rampur 3. Aligarh 4. Mathura 5. Agra 6. Ferozabad 7. Mainpuri 8. Badaun 9. Pilibhit 10.Shahjahanpur 11. Bareilly

V.2 Growth in Area of Cash Crops among Districts of Central Region:

The Central region was found to be poised for the best growth in GCA of cash crops in comparison with all other regions of the state during the period studies here. None of its districts had experienced negative growth. Four districts achieved medium and four district low level of growth. The districts of Lucknow and Barabanki had showed high level of growth in their area of cash crops during the reference period as evident from Table-4. Thus, all the districts of Central region in Uttar Pradesh have performed better in terms of growth in their area of cash crops after economic reforms up to the year 2000.

Table-4: Growth in CGA of cash crops in districts of Central Region during 1990-91 and 1999-2000

High Growth (2 percent & above)	Medium Growth (1-2 percent)	Low Growth (below 1 percent)	Negative Growth
1. Lucknow 2. Barabanki	1. Sitapur 2. Raibarelly 3. Etawah 4. Fatehpur	1. Lakhimpur 2. Hardoi 3. Unnao 4. Kanpur Dehat	**Nil**

V.3 Growth in Area of Cash Crops among Districts of Eastern Region:

The Eastern region which remained agriculturally backward for quite some time showed dynamism in cultivation of wheat and rice after 1980's. However, the region could not achieve diversification in favor of cash crops after 1990's

Table-5: Growth in GCA of cash crops in districts of Eastern Region during 1990-91 and 1999-2000

High Growth (2 percent & above)	Medium Growth (1-2 percent)	Low Growth (below 1 percent)	Negative Growth
1. Bahraich 2. Gonda 3. Basti 4. Varanasi	1. Faizabad	1. Sultanpur 2.Siddarth Nagar	1. Pratapgarh 2. Allahabad 3. Mahrajganj 4. Gorakhpur 5. Deoria 6. Azamgarh 7. Mau 8. Ballia 9. Jaunpur 10. Gazipur 11. Mirzapur 12. Sonbhadra

Which became evident from the fact that Eastern region as a whole demonstrated a negligible increase in total area under cash crops during 1990-91 and 1999-2000

as reflected from Table-5? Out of total nineteen (19) districts of the Eastern region analyzed here, twelve (12) showed negative growths in their area of cash crops during the reference period. Only four (4) districts namely Bahraich, Gonda, Basti and Varanasi experienced high level growth of 2 percent and above while Faizabad district achieved medium level growth of 1-2 percent. The districts of Sultanpur and Siddharth Nagar achieved low growth during the period analyzed.

V.4 Growth in Area of Cash Crops among Districts of Bundelkhand Region:

The geo-physical conditions in Bundelkhand region do not lend support to a highly diversified type of agriculture. The region has comparative advantage in the cultivation of pulses which are also the high value crops with high demand.

Table-6: Growth in GCA of cash crops in districts of Bundelkhand Region: 1990-91 and 1999-2000

High Growth (2 percent & above)	Medium Growth (1-2 percent)	Low Growth (below 1 percent)	Negative Growth
1.Jhansi	1.Jalaun	1. Banda	1. Lalitpur 2. Hamirpur

The region, on the whole, has shown a positive compound growth of 1.76 percent during 1990-91 and 1999-2000. But two of its districts namely Lalitpur and Hamirpur experienced negative growth. Banda district had low growth while Jhansi achieved high growth and Jalaun remain at middle level as evident from the Table-6.

V. Area under Cash Crops: Ranking of Districts:

The above analysis showed the performance of different districts at regional level in terms of change in their area under commercial crops during 1990-91 to 1999-

2000. It does not reveal the change in rank which each district has achieved over the years by having a change in its percentage of area under commercial crops to gross cropped area. The ranking of districts on the basis of level of area under commercial crops to GCA will show whether high/low ranking districts could achieve a change in their respective position over the years or the speed of commercialization is such that most of the districts are on the same position despite the growth in area over a period of time.

V-1: Change of Rank of Districts in Crop Diversification in Western Region:

The ranking of districts of Western region as shown in Annexure-2 indicated that eleven (11) districts remained on the same rank in 1999-2000 as they were in 1990-91. Only nine (9) districts changed their rank during this period. The Saharanpur district was on the fourth (4) rank and Gaziabad on the fifth (5) in first year but both these districts swapped their ranks with each other in the later year. Mathura district was on the seventh (7) rank in 1990-91 which was reduced to eleventh (11) rank in 1999-2000. Farukkabad district improved its rank from eleventh (11) to seventh (7) while Rampur and Ferozabad were having twelfth (12) and thirteen (13) positions respectively in 1990-91 but interchanged their rank with each other in 1999-2000. Thus, the four districts improved their position while five (5) districts showed deterioration in their positions. This indicated that the number of districts slipping down from their ranks in 1990-91 to 1999-2000 was higher as compared to the districts improving their rank. On this basis, it can be concluded that the process of commercial in agriculture has followed the dictum of ONE STEP FOREWARD AND TWO STEP BACK WARD in Western region of Uttar Pradesh after economic liberalization as evident from the Table-7.

V-2: Change of Rank of Districts in Crop Diversification in Central Region:

It is evident from Annexure-2 that every district in Central region did not change its rank in 1999-2000 from 1990-91. It has been found earlier that every district of

the region showed positive growth in the area under commercial crops but the rate of change has been so uni-directional that every district maintained its rank in terms of area under commercial crops to GCA in 1999-2000 to the position of 1990-91.

Table- 7: Ranks of Districts of Western Region during 1999-2000 as against 1990-91

Districts Stagnant on their Ranks in 1999-2000 as in 1990-91	Districts improving their ranks in 1999-2000 from 1990-91	Districts slipping down from their ranks in 1999-2000 from 1990-91
1. Meerut 2. Muzaffar Nagar 3. Bijnore 4. Agra 5. Moradabad 6. Bulandshahar 7. Bareilly 8. Pilibhit 9. Etah 10. Etawah 11. Mainpuri	1. Gaziabad 2. Farukkabad 3. Ferozabad 4. Shahjahanpur	1. Saharanpur 2. Mathura 3. Rampur 4. Aligarh 5. Badaun

V-3 Change of Rank of Districts in Crop Diversification in Eastern Region:

It is evident from the Table-8 that only three districts in Eastern region of the state could maintain their rank in terms of percentage of area under commercial crop in GCA in 1999-2000 at the level of 1990-91. These districts are Jaunpur, Pratapgarh and Siddharth Nagar. Six districts namely the Faizabad, Sultanpur, Varanasi, Basti, Gonda and Bahraich improved their rank but remaining more than half districts lost their ranks in 1999-2000 as compared to their position during 1990-91.

Table-8: Ranks of Districts of Eastern Region during 1999-2000 as against 1990-91

Districts Stagnant on their Ranks in 1999-2000 as in 1990-91	Districts improving their ranks in 1999-2000 from 1990-91	Districts slipping down from their ranks in 1999-2000 from 1990-91
1. Jaunpur 2. Pratapgarh 3. Siddharth Nagar	1. Faizabad 2. Sultanpur 3. Varanasi 4. Basti 5. Gonda 6. Bahraich	1. Deoria 2. Sonbhadra 3. Gazipur 4. Mahrajganj 5. Ballia 6. Mau 7. Azamgarh 8. Mirzapur 9. Gorakhpur 10. Allahabad

V-4: Change of Rank of Districts in Crop Diversification in Bundelkhand Region:

It is evident from Table-9 that four (4) districts in Bundelkhand region could maintain their rank in 1999-2000 which they had during 1990-91. Only Jalaun district showed improved while Lalitpur lost its ranks in later than previous period. It reflected that in Bundelkhand region; change in area under commercial crops in their respective gross cropped area has not been sharp to change the position of the districts.

Table- 9: Ranks of Districts of Bundelkhand Region during 1999-2000 as against 1990-91

Districts Stagnant on their Ranks in 1999-2000 as in 1990-91	Districts improving their ranks in 1999-2000 from 1990-91	Districts slipping down from their ranks in 1999-2000 from 1990-91
1. Jhansi 2. Banda 3. Hamirpur	1. Jalaun	1. Lalitpur

The analysis, thus, showed that majority of the districts in Uttar Pradesh could not remain on the rank in terms of percentage of area under commercial crops to their

GCA during post reform period as compared to the beginning of pre-reform period. This could be so because the speed of favorable change in area under commercial crops could not be fast within the districts.

VI. Source of Cash Crops Diversification in U.P.:

There are two sources of crop diversification. One is the crop substitution and other is the crop intensification. It was found that the main source of crop diversification up to 1999-2000 has been the crop substitution in Uttar Pradesh. Some scholars have found that share of crop substitution in diversification was as high as 63 percent and share of augmenting cropping intensity was nearly 37 percent. Our analysis has also showed that cropping intensity in U.P. did not display any significant change in 1999-2000 from 1990-91 as evident from following Table-10.

Table-10: Change in Cropping Intensity in Uttar Pradesh

Region	Cropping Intensity		Compound Growth Rate
	1990-91	1999-2000	
Western	152.83	157.45	0.33
Central	141.75	148.62	0.53
Eastern	153.95	152.12	-0.13
Bundelkhand	113.01	117.56	0.44

The above table shows that there has been eligible increase in cropping intensity in Western region, Central region and Bundelkhand region. The Eastern region showed a decline in cropping intensity. At the state level, the growth in cropping intensity was only by 0.44 percent during 1990-91 and 1999-2000. Most of the districts across all the four regions experienced nominal growth in cropping intensity. It was found that eight (8) districts in Western region, two (2) districts in Central region and eight (8) districts of Eastern region showed a decline in their cropping intensity during the reference period. Thus, the Agricultural Policy

documents of Uttar Pradesh which envisaged an increase in cropping intensity to the level of 200 percent by the end of 2007, appears to be impossible to achieve as evident from the trend observed here.

VII. Conclusions:

The study noted that agricultural economy of Uttar Pradesh has been largely food crop based during the economic reform period as it was before. Wheat and rice are still the principal crops in the state. The pace of commercial in agriculture has been found to be slow in the state. Even the most commercialized western region has shown declining trend in its area under commercial crops in 1999-2000 as against 1990-1991. Majority of the districts in Western, Eastern and Bundelkhand regions have lost their area of commercial crops during 1999-2000 against the level of 1990-91. In this way majority of districts have slipped down from their ranks in 1999-2000 as compared to their position in the year 1990-91. The role of cropping intensity in boosting the area of cash crops has been found to be negligible. The observed trends are deterrent in achieving the objectives of Agricultural Policy of state which has emphasized the speedy commercialization of agriculture through cultivation of high value crops by crop intensification.

Note and References:

Note: The author is very grateful to Prof. A.K. Singh for his valuable guidance in writing of this paper.

References:

Bhalla, G.S. and Gurmail Singh (1997), 'Recent Developments in Indian Agriculture: A State Level Analysis', Economic and Political Weekly, Vol. 32, No. 13, March 29.

Chand, Ramesh (1996), 'Diversification through High Value Crops in Western Himalayan Region: Evidences from Himanchal Pradesh, Indian Journal of Agricultural Economics, Vol. 41, No. 4.

Singh, Ajit. Kumar (2002), 'Crop Diversification as a Strategy of Raising Farm Income: A Case Study of Uttar Pradesh', Man Power Journal, Vol. XXXVII, No 2&3.

Singh, Ajit, Kumar (1998), 'Potential Diversification Towards High Value Crops in Uttar Pradesh', Giri Institute of Development Studies, Lucknow (mimeo).

Vyas, V.S. (1996), 'Diversification of Agriculture:Concept, Rationale and Approaches', Indian Journal of Agricultural Economics, Vol. 51, No. 4.

Annexure-1: Percentage of gross cultivated area under commercial crops Cropping Intensity in Uttar Pradesh

Sl. No.	District	% of Area under Cash Crops		Cropping Intensity	
		1990-91	1999-2000	1990-91	1999-2000
1.	Saharanpur	49.35	49.72	160.00	157.03
2.	Muzaffar Nagar	60.10	62.46	155.63	152.66
3.	Bijnore	57.36	58.76	128.54	131.40
4.	Moradabad	36.60	32.45	150.71	165.51
5.	Rampur	25.94	22.91	167.29	185.68
6.	Meerut	60.65	64.20	158.45	154.96
7.	Gaziabad	45.37	54.35	164.67	158.21
8.	Bulandshahar	27.54	30.96	175.12	169.75
9.	Aligarh	21.94	18.25	163.64	165.39
10.	Mathura	39.34	25.37	138.33	151.40
11.	Agra	43.74	34.16	131.60	142.28
12.	Ferozabad	23.87	22.98	139.71	156.94
13.	Etah	15.87	17.95	163.23	162.99
14.	Mainpuri	13.76	12.01	166.51	159.82
15.	Badaun	19.67	18.53	149.13	161.05
16.	Bareilly	27.19	26.42	151.16	162.37
17.	Pilibhit	20.90	18.55	165.06	164.85
18.	Shahjahanpur	20.27	18.81	150.16	161.27
19.	Farrukhabad	26.85	34.13	146.10	148.96
20.	Etawah	14.43	15.99	146.82	155.00
	Western Region	**33.07**	**31.65**	**152.83**	**157.45**
21.	Lakhimpurkheri	35.80	37.32	137.00	146.49
22.	Sitapur	23.44	26.44	130.65	141.78
23.	Hardoi	15.88	17.26	145.77	150.76
24.	Unnao	13.05	13.17	146.21	150.16
25.	Lucknow	16.09	21.65	135.50	151.10
26.	Raebareilly	7.95	8.84	149.85	143.24
27.	Kanpur Dehat	15.37	16.80	136.67	136.54
28.	Etawah	18.54	22.07	144.53	154.69
29.	Fatehpur	11.56	13.13	133.96	146.81
30.	Barabanki	16.19	21.91	165.05	171.06
	Central Region	**18.43**	**21.12**	**141.75**	**148.62**
31.	Jalaun	7.29	8.56	106.97	108.23
32.	Jhansi	10.28	14.14	115.90	119.29
33.	Lalitpur	9.05	7.90	125.69	135.07
34.	Hamirpur	8.66	7.84	105.65	109.71
35.	Banda	3.62	3.90	117.44	123.36
	Bundelkhand Region	**7.33**	**8.58**	**113.01**	**117.56**

36.	Pratapgarh	7.03	6.36	154.11	151.86
37.	Allahabad	7.92	6.91	142.21	154.18
38.	Faizabad	12.26	14.29	163.14	150.79
39.	Sultanpur	11.50	12.35	152.83	154.31
40.	Bahraich	7.18	10.54	157.78	148.90
41.	Gonda	9.52	11.65	154.01	158.60
42.	Sidharthnagar	5.70	5.84	151.69	137.47
43.	Basti	9.60	14.18	155.86	140.62
44.	Mahrajganj	11.48	10.04	170.91	174.64
45.	Gorakhpur	8.59	7.32	142.11	148.77
46.	Deoria	19.85	10.57	155.60	157.95
47.	Azamgarh	10.04	8.56	160.95	163.50
48.	Mau	10.26	8.33	171.24	167.22
49.	Ballia	10.75	9.64	153.30	156.47
50.	Jaunpur	9.72	9.23	158.19	154.41
51.	Gazipur	12.11	12.00	149.03	153.71
52.	Varanasi	11.08	14.63	157.11	150.41
53.	Mirzapur	9.75	8.78	140.98	144.10
54.	Sonbhadra	14.61	11.61	141.57	141.96
	Eastern Region	**10.50**	**10.55**	**153.95**	**152.12**
	All U.P.	**20.01**	**20.33**	**147.29**	**149.34**

Annexure-2: Gross Cultivated Area under Commercial Crops: Ranking of Districts of Western Region

Sly. No.	District	Rank in 1990-91	Rank in 1999-2000
1	Meerut	I	I
2.	Muzaffar Nagar	II	II
3.	Bijnore	III	III
4.	Saharanpur	IV	V
5.	Gaziabad	V	IV
6.	Agra	VI	VI
7.	Mathura	VII	XI
8.	Moradabad	VIII	VIII
9.	Bulandshahar	IX	IX
10.	Bareilly	X	X

11.	Farukkabad	XI	VII
12.	Rampur	XII	XIII
13.	Ferozabad	XIII	XII
14.	Aligarh	XIV	XVII
15.	Pilibhit	XV	XV
16.	Shahjahanpur	XVI	XIV
17.	Badaun	XVII	XVI
18.	Etah	XVIII	XVIII
19.	Etawah	XIX	XIX
20.	Mainpuri	XX	XX

Annexure-2: Gross Cultivated Area under Commercial Crops: Ranking of Districts of Central Region

Sl. No.	District	Rank in 1990-91	Rank in 1999-2000
1	Lakhimpur	I	I
2.	Sitapur	II	II
3.	Etawah	III	III
4.	Barabanki	IV	V
5.	Lucknow	V	IV
6.	Hardoi	VI	VI
7.	Kanpur Dehat	VII	XI
8.	Unnao	VIII	VIII
9.	Fatehpur	IX	IX
10.	Raebareilly	X	X

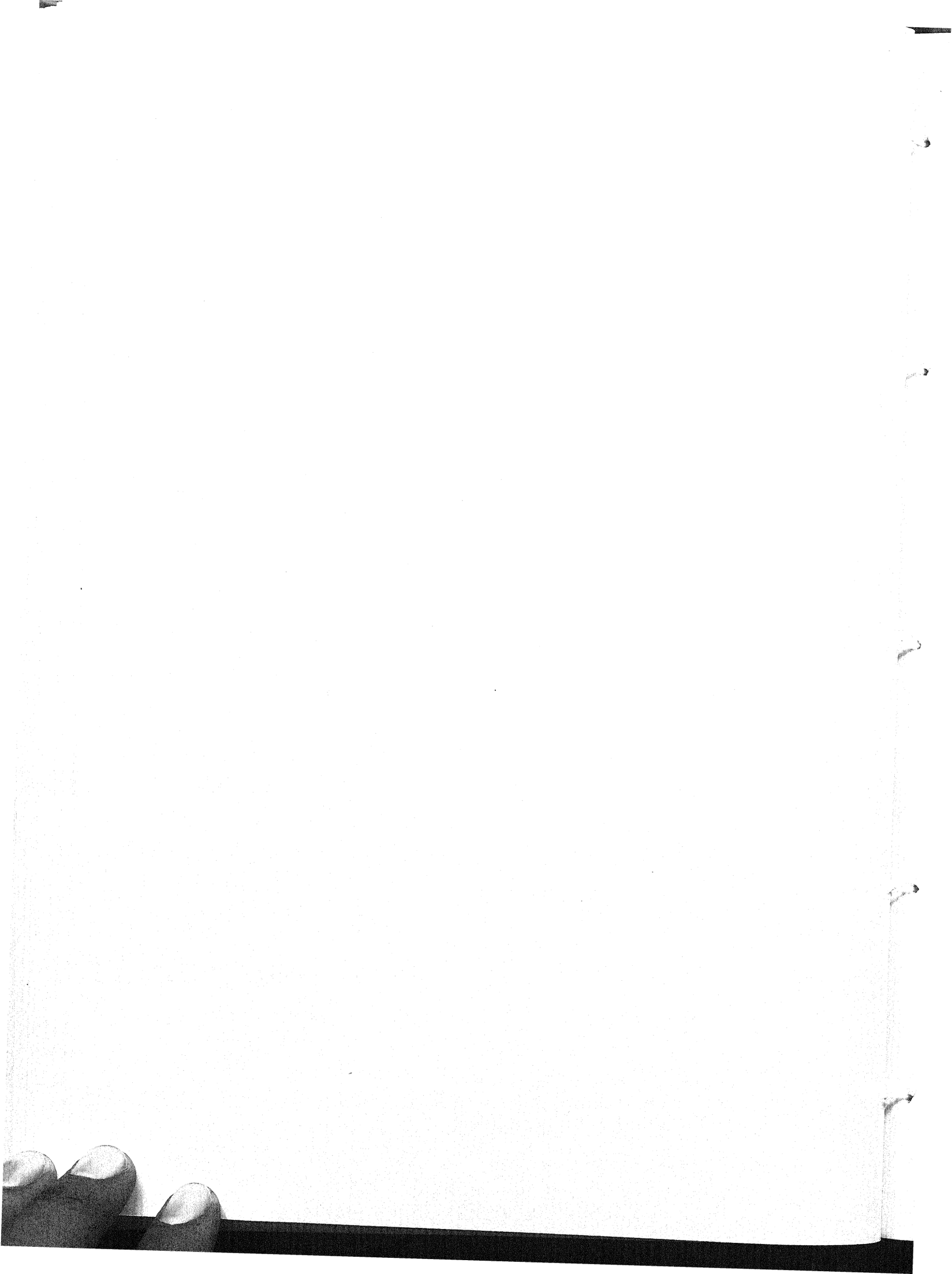
Annexure-2: Gross Cultivated Area under Commercial Crops: Ranking of Districts of Bundelkhand Region

Sl. No.	District	Rank in 1990-91	Rank in 1999-2000
1.	Jhansi	I	I
2.	Lalitpur	II	IV
3.	Hamirpur	III	III
4.	Jalaun	IV	II
5.	Banda	V	V

Annexure-2: Gross Cultivated Area under Commercial Crops: Ranking of Districts of Eastern Region

Sl. No.	District	Rank in 1990-91	Rank in 1999-2000
1	Deoria	I	VIII
2.	Sonbhadra	II	VII
3.	Faizabad	III	II
4.	Gazipur	IV	V
5.	Sultanpur	V	IV
6.	Maharajganj	VI	X
7.	Varanasi	VII	I
8.	Ballia	VIII	XI
9.	Mau	IX	XV
10.	Azamgarh	X	XIV
11.	Mirzapur	XI	XIII
12.	Jaunpur	XII	XII
13.	Basti	XIII	III
14.	Gonda	XIV	VI
15.	Gorakhpur	XV	XVI
16.	Allahabad	XVI	XVII

17.	Bahraich	XVII	IX
18.	Pratapgarh	XVIII	XVIII
19.	Siddharth Nagar	XIX	XIX



FARMERS IN THE DEBT TRAP AND DESPAIR : AN EXERCISE TOWARDS UNDERSTANDING CHALLENGES TO AGRICULTURAL GROWTH

By

D.M. DIWAKAR

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

Farmers in the Debt Trap and Despair: An Exercise towards Understanding Challenges to Agricultural Growth

- D.M.Diwakar*

Decelerating growth performance of Indian agriculture amidst drive of modernisation and diversification, by and large dependant on vagaries of monsoon and unprotected from the risks of crop failures despite expansion of significant network of irrigation, rising cost of cultivation, embedded with insufficient infrastructure support, slowing down of employment and income left farmers trapped in the syndrome of indebtedness and despair. Findings of the Royal Commission still hold good that farmers born, live, die in debt and transfer debt liability to next generation. Institutional initiatives to provide cover for credit support and insurance are yet to prove effective to replace the dominance of usury network of exploitation despite having prohibitive laws in place. Increasing debt burden of farmers often led to a syndrome of despair and committing suicides. Increasing number of debt driven suicides in recent years became a matter of serious social concern. This exercise is intended to analyse the dimensions and genesis of rural indebtedness, credit markets and institutions, and their implications on Indian farmers. This paper is divided in four parts. Part one deals with extent of rural indebtedness. Part two presents a brief discussion on performance and dimensions of credit markets and institutions. Part three analyses genesis and implications of rural indebtedness and part four attempts to consolidate discussions for policy imperatives.

I Extent of Indebtedness

Rural indebtedness is an indicative of deficiency of rural income to carry out necessary activities for livelihood support. Even today agriculture remains the main source of rural income and livelihood support in India. Official document of the Government of India suggests that contribution of agriculture to gross domestic product (GDP) has been declining not only because other sectors are growing fast but

Author is Professor of Economics, Giri Institute of Development Studies, Sector O, Aliganj, Lucknow 226 024. email – dmdiwakar@yahoo.co.in

also because of continued neglect of this sector. Contribution of agriculture declined from 54.7 per cent of GDP in 1950-51 to the level of merely 22.97 per cent in 2004-05 (GOI, 2006). It implies that rural income has been declining continuously. Income gap between rural and urban area has been widening. As a result majority of farmers and agricultural labourers have generally been sustaining their livelihood through mobilization of resources by borrowings for production and consumption purposes. In order to address the deficient need of the farmers many players – formal and informal - have entered to operate in the credit market.

NSSO survey report suggests that about 48.6 per cent of the farmers' households were indebted in 2003 with an average outstanding loan amount of Rs. 12585 (Table 1). Out of indebted farmers households 31.3 per cent were from the category of landless and below marginal farmers, 29.8 per cent were from marginal farmers and 18.8 per cent from small farmers category. Thus, altogether 80 per cent of the indebted households were from the poorest lot in terms of land in possession. Prevalence rate of indebtedness of landless labour households of rural area were 45.3

Table 1: Estimated Number of Total and Indebted Farmer Households in Each Size Class of Land Possessed in India (January-December 2003)

Size Class of Land Possessed	Estimated Number of Farmer Households ('00)	Percentage of Farmer Households	Estimated Number of Indebted Farmer Households ('00)	Percentage of Indebted Farmer Households	Prevalence Rate of Indebtedness (Percentage)	Amount of Outstanding Loan (In Rs.) per Farmer Household
<0.01	12594	1.4	5708	1.3	45.3	6121
0.01-0.40	292867	32.8	130112	30.0	44.4	6545
0.41-1.00	283610	31.7	129211	29.8	45.6	8623
1.01-2.00	160600	18.0	81920	18.8	51	13762
2.01-4.00	93504	10.5	54409	12.5	58.2	23456
4.01-10.00	42581	4.8	27734	6.4	65.1	42532
10.00+	7748	0.8	5148	1.2	66.4	73232
All Sizes	893504	100.0	434242	100.0	48.6	12585

Source : Indebtedness of Farmer Households in India, NSS Report No. 498, 59th Round (January-December 2003).

per cent, who owed on an average Rs. 6121. With the increasing size of land in possession prevalent rate of indebtedness increased and so was the amount of loan.

Considering per farmer loan amount by monthly per capita expenditure (MPCE), extent of indebtedness was higher in lower consumption bracket. With the increase in monthly per capita expenditure percentage of indebtedness decreased (Table 2). However, amount of loan per farmer remained positive with the increasing monthly per capita expenditure. Indebtedness by social groups suggest that spread of indebtedness and loan amount was lowest in

Table 2: MPCE Class-wise Average Amount of Outstanding Loan per Farmer Household in Different Social Groups in India (January-December 2003)

(In Rs.)

MPCE Class	Social Groups					
	STs	SCs	OBC	Others	All	% HHs Indebted
0-225	2859	5743	8155	8582	6498	13.52
225-255	4484	6046	9890	11031	8435	8.41
255-300	5326	6383	9769	11370	8865	14.08
300-340	5735	6138	11935	13262	10453	12.07
340-380	4330	7868	14646	14201	12067	10.83
380-420	7254	7706	15264	19037	14484	8.68
420-470	8588	8164	17858	19540	16178	8.64
470-525	10706	10867	17574	20084	16872	7.12
525-615	7652	12460	17888	23851	18793	7.19
615-775	10344	9560	25728	32304	25816	5.77
775-950	17260	10977	35284	37407	32676	2.22
>950	33727	16437	44473	47806	44434	1.46
All Classes	5506	7167	13489	18118	12585	48.60
% HHs Indebted	4.76	8.72	19.71	13.02	48.60	

Source : Indebtedness of Farmer Households in India, NSS Report No. 498, 59th Round (January-December 2003).

STs and second lowest in SCs. OBCs reported higher spread of indebtedness and amount of loan than SCs but lower spread and higher amount of loan than general category of social group. State wise distribution of farmers' indebtedness suggests that Andhra Pradesh registered highest incidence of debts (Table 3) with 82 per cent followed by Tamil Nadu (74.5 per cent), Punjab (65.4 per cent), Kerala (64.4 per cent) and Karnataka (61.6 per cent). Uttaranchal reported lowest percentage of

farmers with loan. In terms of per farmer amount of loan Punjab carried highest burden of loan amount Rs. 41576 followed by Kerala (33907). Haryana stepped third with Rs. 26007 followed by Andhra Pradesh (Rs.23965), Tamil Nadu (Rs.23963), Rajasthan (Rs.18372), Karnataka (Rs.18135) and Maharashrtra (Rs.16973). Among social groups of STs, per farmer loan amount was highest in Punjab (Rs.1,18,495).

Table 3: State-wise Average Amount of Outstanding Loans (Rs) per Farmer Household of Different Social Groups in India
(January-December 2003)

Major States	Social Groups					Percentage of Farmer Households Indebted	Ranks for Amount of Loan per Farmer	
	Scheduled Tribes	Scheduled Castes	Other Backward Castes	Others	All			
Andhra Pradesh	12760	12720	23697	37802	23965	82.0	1	4
Assam	391	1141	598	971	813	18.1	18	19
Bihar	3619	3161	4010	6814	4476	33.0	15	15
Chhattisgarh	1545	5386	5944	8816	4122	40.2	14	16
Gujarat	7981	9175	13800	26333	15526	51.9	9	9
Haryana	23555	13341	26226	31548	26007	53.1	7	3
Jammu & Kashmir	0	931	1029	2346	1903	31.8	16	17
Jharkhand	746	2992	3181	3304	2205	20.9	17	14
Karnataka	11259	6405	17210	24901	18135	61.6	5	7
Kerala	10832	13308	33116	38013	33907	64.4	4	2
Madhya Pradesh	4812	8910	15628	25411	14218	50.8	10	10
Maharashtra	6379	8845	18205	21417	16973	54.8	6	8
Orissa	2360	4850	7845	10439	5871	47.8	12	12
Punjab	118495	10399	21862	6617	41576	65.4	3	1
Rajasthan	12018	16708	22009	18538	18372	52.4	8	6
Tamil Nadu	21023	12786	27355	23782	23963	74.5	2	5
Uttar Pradesh	6706	4893	7280	11290	7425	40.3	13	11
Uttaranchal	0	951	4184	914	1108	7.2	19	18
West Bengal	2349	4298	5816	6118	5237	50.1	11	13
India	5506	7167	13489	18118	12585	48.6	-	

Source : Indebtedness of Farmer Households in India, NSS Report No. 498, 59th Round (January-December 2003).

followed by Haryana (Rs.23555), Tamil Nadu (Rs.21023) and Andhra Pradesh (Rs.12760). In case of SCs per farmer loan amount was highest in Rajasthan (Rs.16708) followed by Haryana (Rs. 13341), Kerala (Rs. 13308), Tamil Nadu 12786 and Andhra Pradesh (Rs.12720). For OBCs per farmer loan amount was highest in Kerala (Rs. 33116), followed by Tamil Nadu (Rs.27355), Haryana (Rs. 26226), Andhra Pradesh (Rs.23697), and Rajasthan (Rs. 22009). In general category also per farmer loan amount was highest in Kerala (Rs.38013) followed by Andhra Pradesh (Rs.37802), Haryana (Rs.31548), Gujarat, Karnataka and Tamil Nadu.

Amount of loan taken was generally utilized for production and consumption purposes. Data suggest that 30.6 per cent of loan amount was spent for capital expenditure in farm business followed by current capital expenditure (27.8 per cent). Non-farm business consumed 6.7 per cent (Table 4). Thus, altogether 65 per cent loan amount was directly used for production purposes. Another 15 per cent was spent for social development and remaining 20 per cent was on marriage and other ceremonial

Table 4:State-wise Percentage Distribution of Outstanding Loan Amount (Rs) Taken by Farmer Households by Purpose of Loan in India

Major States	Purpose of Loan (January-December 2003)								
	Capital Expenditure in Farm Business	Current Expenditure in Farm Business	Non-Farm Business	Consumption Expenditure	Marriages and Ceremonies	Education	Medical Treatment	Other Expenditure	All Purposes
Andhra Pradesh	23.4	38.1	3.2	11.5	0.6	1.4	2.4	10.5	100
Assam	16.6	6.7	16.2	12.4	11.8	0.1	1.5	34.8	100
Bihar	30.8	8.6	7.6	6.4	22.9	2.3	10.2	11.2	100
Chhattisgarh	40.3	30.0	8.2	6.7	6.4	0.3	3.4	4.7	100
Gujarat	20.3	50.3	3.9	6.3	10.2	0.5	3.0	5.6	100
Haryana	36.0	26.2	6.8	4.8	14.0	0.0	2.0	10.3	100
Jammu & Kashmir	26.0	3.2	24.1	18.3	9.3	0.0	2.0	17.1	100
Jharkhand	27.2	5.3	24.8	10.5	9.8	0.0	0.9	21.6	100
Karnataka	30.5	37.5	9.8	5.6	7.4	0.6	0.2	8.1	100
Kerala	11.0	10.4	22.8	10.2	11.2	1.4	2.5	30.5	100
Madhya Pradesh	47.0	21.3	1.4	9.6	14.4	0.1	3.6	2.7	100
Maharashtra	37.9	37.5	4.8	4.2	4.9	0.9	1.5	8.3	100
Orissa	28.9	24.4	11.5	11.4	14.0	0.1	2.9	6.9	100
Punjab	26.4	36.0	4.4	8.5	10.2	0.0	2.6	12.0	100
Rajasthan	37.5	19.7	2.2	13.8	17.6	0.8	3.9	4.4	100
Tamil Nadu	24.3	25.1	5.5	13.1	8.7	2.6	4.1	16.6	100
Uttar Pradesh	40.3	20.6	7.0	6.8	11.8	0.2	6.1	7.1	100
Uttaranchal	18.4	15.8	17.3	9.2	7.4	0.0	2.2	29.7	100
West Bengal	24.4	21.3	10.3	7.2	11.1	0.5	5.1	20.1	100
India	**30.6**	**27.8**	**6.7**	**8.8**	**11.1**	**0.8**	**3.3**	**10.8**	**100**

Source: Indebtedness of Farmer Households in India, NSS Report No. 498, 59th Round (January-December 2003).

occasions and on consumption expenditure. Medical treatment and other expenditure could eat significant proportion in some of the states.

II Credit Market and Institutions

Rural credit market has both formal and informal players. Formal players are government, cooperatives, commercial banks, whereas informal credit market is run by and large by moneylenders - often farmer, traders including dealers of inputs, other professionals, friends and relatives, and others operate as moneylenders. NSS data suggest (Table 5) that commercial banks remained major player in providing credit to farmers (35.6 per cent) followed by cooperatives (19.6 per cent) and government (2.5 per cent). Altogether 57.7 per cent of credit taken by farmers was provided through institutional arrangements.

Table 5: Percentage Distribution of Average Amount of Loan (Rs) Taken by Farmers by Source and Farm Size in India

Source/Farm Size	<0.1	0.1-0.4	0.4-1.0	1.0-2.0	2.0-4.0	4.0-10	10+	All Size
Government	1.9	4.0	3.8	1.7	1.5	1.3	1.7	2.5
Co-operatives	5.3	14.5	17.0	20.5	22.6	23.0	23.2	19.6
Commercial Banks	15.4	24.8	32.0	35.4	41.0	44.5	42.7	35.6
Agriculture/Professional Money Lenders	47.3	31.8	30.8	25.9	23.4	16.7	17.2	25.7
Traders	4.0	4.9	4.6	4.2	4.7	6.1	10.6	5.2
Relatives & Friends	23.1	14.9	9.1	8.8	5.1	5.6	4.0	8.5
Doctors,Lawyers, and Other Professionals	1.0	1.4	0.7	0.8	0.4	1.5	0.0	0.9
Others	2.0	3.7	2.0	2.6	1.4	1.2	0.6	2.1
Total	100	100	100	100	100	100	100	100

Source: NSSO, 59th Round, Report No. 498, p.A-96.

Remaining 42.3 per cent credit market was controlled by informal players. These players may be categorized in one bracket of moneylenders with a few individual exceptions. It is evident from data in reference that credit extended by cooperatives and commercial banks emerged positively directed towards increasing size of holdings whereas credit extended by moneylenders had inverse direction.

Landless households took 47.3 per cent loan from moneylenders alone. Adding extended informal usury network it came to 77 per cent. Near landless and marginal households took 56.7 per cent and 47.2 per cent of loan amount respectively from informal usury networks. State wise variations suggest that non-institutional share of loan finance was higher in many states (Table 6). Non-institutional finance controlled greater credit market to the tune of 68 per cent in Andhra Pradesh followed by Rajasthan, Assam Bihar and Punjab.

Table 6: State Wise Percentage Distribution of Average Amount of Loan (Rs) Taken by Farmers by Source

Major States	Source of Finance					
	Government	Cooperatives	Commercial Banks and RRBs	Money Lender	Others	ML+Oth
Andhra Pradesh	1.0	10.4	20.0	53.4	15.1	68.5
Assam	7.0	2.7	27.8	15.5	47.1	62.6
Bihar	2.2	2.5	37.0	32.8	25.7	58.5
Gujarat	0.5	41.8	27.2	6.5	24.0	30.5
Haryana	1.1	23.9	42.6	24.1	8.4	32.5
Karnataka	1.9	16.9	50.1	20.0	11.2	31.2
Kerala	4.9	28.3	49.1	7.4	10.2	17.6
Madhya Pradesh	1.9	16.9	38.1	22.6	20.4	43.0
Maharashtra	1.2	48.5	34.1	6.8	9.4	16.2
Orissa	13.0	18.1	43.7	14.8	10.3	25.1
Punjab	1.9	17.6	28.4	36.3	15.8	52.1
Rajasthan	1.3	5.9	27.0	36.5	29.3	65.8
Tamil Nadu	2.0	23.3	28.1	39.7	6.8	46.5
Uttar Pradesh	2.4	6.7	51.2	19.1	20.6	39.7
West Bengal	10.3	19.2	28.5	13.0	29.1	42.1
India	2.5	19.6	35.6	25.7	16.7	42.4

Source: NSSO, 59th Round

Although Maharashtra provided 83 .8 per cent credit through institutional sources farmers were not free from distress and suicides. This suggests that provision of institutional credit is although important it alone cannot be sufficient to rescue the farmers from the syndrome of despair.

Flow of institutional credit amount to agriculture over the years increased many folds by cooperatives, commercial and regional rural banks in terms of short, medium and long terms loan. But the question of distributional aspects of credit remained to be addressed effectively. Total credit extended by cooperatives was to the tune of Rs.24.23 crore in 1950-51 to Rs.15957 crore in 1998-99. Credit volume extended by commercial banks and regional rural banks were even higher than cooperatives although initials were the same. Their initial credit amount was to the tune of Rs.24.23 crore in 1950-51, which increased to Rs.36860 crore in 1998-99. Even provisional estimates, projection and targets indicated increasing volume of credit. However, the share of agriculture in total bank credit had steadily increased under the impulse of bank nationalization and reached 18 per cent towards the end of the 1980s, but thereafter agriculture suffered neglect of institutional credit delivery mechanism in the post reform period (Table 7).

Table 7: Outstanding Credit of Scheduled Commercial Banks Against Agriculture

Year	No. of Accounts	Percent of All Loan Accounts	Amounts (Rs. In Crore)	Percent to Aggregate Loan Amount
Dec. 1972	1371975	31.6	501	9.0
Dec. 1981	11231727	50.5	4863	17.1
Dec. 1987	21907916	47.4	12112	17.7
March 1991	27257093	44.0	18573	15.0
March 2003	20840434	35.0	75935	10.0

Source: RBI's Basic Statistical Returns of Scheduled Commercial Banks in India, various Issues, (Shetty, EPW, 2004)

The achievement has been almost completely reversed and the agricultures credit share dipped to less than 10 per cent in the late 90s – a ratio that had prevailed in the early 1970s. Even the number of farm loan accounts with scheduled commercial banks has declined in absolute terms from 27.74 million in March 1992 to 20.84 million in March 2003 (Shetty, EPW, July 17, 2004).

Table 8: Per Hectare Agricultural Credit in India
(1998-1999 to 2003-2004)

(Rs. at Current Prices)

Item	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Per Hectare Credit	1940	2435	2780	3266	3727	4578
Growth (%)	-	25.5	14.2	17.4	14.1	22.8

Source: Lok Sabha Starred Question No. 611, dated on 09.05.2005.

Similarly per hectare credit in rupees to agriculture in recent years increased from 1940 in 1998-99 to 4578 in 2003-04 but annual growth rate of per hectare credit to agriculture (Table 8), which was 25.5 per cent in 1999-00 over previous year, slipped down to 14.2 per cent in 2000-01. After witnessing partially recovered (17.4 per cent) in 2001-02, growth of per hectare credit registered lower rate (14.1 per cent) in 2002-03. This partially explains as to why moneylenders were dominating credit market appropriating surpluses through exorbitant rate of interest (Bhalla, 2005:6).

III Genesis of Indebtedness, Distress, Despair and Suicides

Rural indebtedness is rooted in the non-development decelerating syndrome of agriculture resulting into declining employment and income of farms, cultivators and agricultural labourers. After transfer of power from the British, although steps were initiated for institutional reforms like abolition of zamindary, and redistribution of ceiling surplus land among the producers to unleash productive forces of agriculture and reduce inequality, pro poor agrarian reforms remained incomplete till date and reverse process of agrarian reforms in the interest of corporate farms. Agribusiness and contract farming got currency after liberalization. Without realizing the fact that Indian agriculture is still dominated by subsistence cultivation by and large by marginal and small holdings directly linked with their livelihood focused food grains production.

Performance of agriculture remained at lower profile with a few exceptions, thanks to unpredictable monsoon and indifference of the government towards this sector. On an average this sector grew at the rate of 2.54 per cent during 1950-51 to 2003-04. During pre green revolution (1950-51 to 1964-65) agriculture grew by 2.54 per cent. Interestingly average growth rate in post green revolution period until 1980 was only 2.05 per cent, which was slightly lower than earlier period. Growth rate of agriculture in 1980s was the highest at 3.08 per cent and later in last one decade (1993-94 to 2003-04) this sector suffered deceleration and grew only by 2.38 per cent (Bhalla, 2005: p.2). During last one decade this sector contributed on an average 26.5 per cent of GDP (RBI, 2004-05: p.11). Last year, i.e., during 2004-05, agriculture grew merely by 1.1 per cent and contributed about 20.5 per cent of the GDP. In 2003-04 this sector contributed 21.7 per cent (RBI. 2004-05: p.11).

As shown in Table 9, share of agriculture has been declining from 59.2 per cent of GDP in 1950-51 to 27.36 per cent in 1999-2000 and contribution of agriculture declined further to 22.97 per cent in 2004-05 (Eco. Survey, GOI, 2006). However, this sector still provides livelihood to 63 per cent of the workforce – 39.3 per cent self employed and 23.7 per cent agricultural labour. (NSSO, 60th Round).

Table 9: Percentage Contribution in GDP and Growth of Agriculture in India

Period	Contribution of Agriculture to GDP	Period	Compound Growth Rate of Agriculture
1950-51	59.20	1950-51 2003-04	2.54
1960-61	54.75	1950-51 to 1964-65	2.54
1970-71	48.12	1967-68 to 1979-80	2.05
1980-81	41.82	1980-81 to 1992-93	3.08
1990-91	34.93	1993-94 to 2003-04	2.38
1999-00	27.36	2004-05*	1.1
2004-05	22.97		

Source: Bhalla,(2005) and *RBI Annual Bulletin 2005.

Expansion of irrigation network, use of modern technology - HYV seeds, chemical fertilizer, pesticides combined - cropping pattern changed remarkably. Cropping intensity also improved to the level of 134 per cent. But percentage coverage of food grains did not change significantly until 1980-81. Coverage of total cereals hardly changed and remained at the level of about 75 per cent. During 1990-

91 to 2000-01 it remained around 65 per cent. Coverage of oil seeds, fruits and vegetables almost doubled and area under HYV increased from 1.2 per cent of GCA to 41.17 per cent. Paddy coverage of HYV has increased from 0.56 per cent in 1966-67 to 17.34 per cent in 1998-99, wheat from 0.34 to 12.61 per cent, jowar from 0.12 to 4.89 per cent, bajra from 0.04 to 3.76 and maize 0.13 to 1.89 per cent of GCA.

Crop wise growth rates of area, production and yield suggest that over all growth rates of area, production and yield of all principal crops during 1949-50 to 2001-02 were 0.57, 2.66 and 1.68, for food grains 0.35, 2.48 and 1.78 per cent and for non food grains 1.26, 2.96 and 1.36 respectively. In pre – Green Revolution period growth rates of all principal crops, in terms of their area production and yield were 1.58, 3.15, 1.21, food grains 1.35, 2.82, 1.36 and non food grains 2.44, 3.74, 0.89 respectively. Post Green Revolution data of growth rates suggest that area and production of all principal crops had lower rate of growth but yield registered higher rate of growth than that of pre green revolution period. Similar was the trend in non-food grain also. In case of food grains area declined, production registered lower rate of growth and yield rate increased. Comparison of 1980s and 1990s suggests that in case of all principal crops area increased in 1990s but production and productivity declined. In case of food grains area declined, production and productivity registered lower rate of growth than 1980s. So far non-food grains are concerned area, production and productivity indicated an increasing trend but production and yield registered lower rate of growth than 1980s.

Important factors inter alia for such poor performance was continued neglect of agriculture towards structural inequity, infrastructure non-development, lack of adequate budgetary allocation of resources for investment despite the fact that agriculture remains mainstay for majority of workforce and one of the major contributors in the Gross Domestic Product (GDP) of the Indian economy. Agricultural investment to GDP witnessed declining trend over the years. During 1985-86 it was 2.3 per cent, which declined to 1.6 per cent in 1989-90 and continued to decline further to 1.4 per cent in 1999-2000 and 1.3 per cent in 2003-04. Realisation at the level of the Planning Commission of the Government of India suggests that private investment can not be sustained without sustained public investment. Thus, syndrome of non-development left this sector under performed.

As a result, employment in rural sector grew at declining rate (Bhalla, IEA, 2005). Data from NSS rounds (Table 10) suggest that there was significant decline in employment in primary sector for both males and females. Needless to mention that primary sector covers maximum and negligible portion is covered by secondary and tertiary sectors. However, there was an increasing trend in these sectors specially for both males and females, of course males rate was higher. But the question is whether

Table 10: Percentage Distribution of Usually Employed by Broad Group of Industry in Rural India from 1983 to 2003-04

Year (Rounds)		Primary		Secondary		Tertiary	
		Male	Female	Male	Female	Male	Female
1983	(38)	77.5	87.5	10.0	7.4	12.2	4.8
1993-94	(50)	74.1	86.2	11.2	8.3	14.7	5.5
2003-04	(60)	65.9	84.1	16.0	9.4	18.0	6.5

Source: NSSO, 60th Round, Report No. 506.

these were substantial to offset the decelerating impacts of primary sector on the income of rural economy. Decelerating growth rate suggests that this sector could not generate sufficient capital and investment even through private sector. However, limited benefits of expansion of the post green revolution technology increased production and productivity but could not be sustained and gain could not be transferred significantly to rural poor in particular and farm sector at large in general. Rather due to lack of effective infrastructure and extension services, modern technology added confusions, increased cost of production, and created environmental complications and imbalances added with greater intensity of exploitation of poor farmers through usury network of non-institutional credit market in absence of effective institutional credit support.

Cost of cultivation increased significantly with the increasing use of modern technology across the states. Variation in terms of percentage rate of change in cost of cultivation since 1991 at least for a few major commodities suggests that lower range of the cost of cultivation for paddy increased from over 73 per cent in 97-98 to 117 per cent in 2002-03 and about 173 per cent in 2004-05 (Table 11). Upper range of cost increased by over 92 per cent in 97-98 to about 149 per cent in 2002-03 and 124

per cent in 2004-05. Lower range of cost of cultivation of wheat increased by 105 per cent in 1997-98 compared to 1990-91, 132 per cent in 2002-03 and 170 per cent by 2004-05. Upper range of variation increased from 85 per cent to 106 per cent. Lower range of cost of cultivation for cotton increased by 149 per cent in 97-98 to 184 per cent in 2002-03 and upper range by 235 and 167 per cent respectively. Cost of cultivation for other crops can similarly worked out to assess the trend and variation of specific crop across the states.

Table 11: Percentage Rate of Change in Cost of Cultivation

Crop		90-91/ 1983-84	97-98/ 90-91	2002-03/ 90-91	2004-05/ 90-91
Paddy	L	89.1	73.6	117.4	172.71
	U	62.6	92.4	148.8	124.0
Wheat	L	40.8	105.4	132.4	170.2
	U	60.0	85.0	106.5	
Cotton	L	-	149.0	184.2	-
	U	-	234.9	167.1	
Sugar	L	123.9	112.1	70.9	-
	U	49.0	106.0	58.2	

Source: Calculated from Cost of Cultivation Data from CACP, Ministry of Agriculture, Govt. of India.

Difference in cost and price structure is another dimension for examination of the viability of the crops. For example, farm harvest price/cost of cultivating cotton ratio in 1997-98 in Haryana, was 0.8633 with respect to Desi and 0.9656 for American cotton and in Punjab 0.5515 and 0.6914 respectively. In Maharashtra price –cost ratio was 0.9452. Thus, farmers of these states were not in a position to recover even cost from the returns. In case of paddy Andhra Pradesh however, was getting Rs. 445 price per quintal against cost of cultivation Rs.436.77. Escalating cost of production with poor returns from agriculture amidst uncertainty of monsoon, risk of crop failures, absence of effective insurance cover, and almost non-existence of extension services pushed farmers into unprecedented hardships. Terms of trade remained against agriculture even after termination of industrial protection and devaluation of rupee in 1991 (Bhalla, IEA, 2005).

Data suggest that about 40 per cent of the farmers did not like to continue with griculture (Table 12). Out of which 27 per cent were reluctant to continue in this occupation precisely because of non-viability. Interstate variations were even higher than that of all India figures.

Table 12: Farmers Indifference, Risks and Insurance Awareness

States	Percentage of Farmers Households						
	Farmers HH Tribe	Like Farming	Do not like Farming	Not Profitable	Risky Farming	Unawareness of Crop Insurance	Insurance Facility Absent
Andhra Pradesh	42	76	24	17	5	75	12
Assam	60	59	41	21	13	63	18
Bihar	61	49	51	36	11	41	49
Chhattisgarh	76	54	46	24	17	66	8
Gujarat	60	67	33	26	5	47	16
Haryana	62	61	39	30	5	47	42
Jammu & Kashmir	91	62	38	21	9	25	72
Jharkhand	77	53	47	30	9	68	24
Karnataka	58	57	43	28	11	54	13
Kerala	44	67	33	28	2	29	10
Madhya Pradesh	67	60	40	22	11	61	10
Maharashtra	56	61	39	29	7	63	7
Orissa	64	53	47	34	9	76	9
Punjab	62	62	38	28	2	20	67
Rajasthan	76	61	39	22	8	55	37
Tamil Nadu	35	69	31	25	4	56	9
Uttar Pradesh	77	59	41	24	10	56	29
West Bengal	57	54	46	36	5	64	23
India	60	60	40	27	8	47	24

Source: NSSO 59th Round. Report No. 496, 2003.

About 36 per cent of the farmers of Bihar, West Bengal, 34 per cent of Orissa, 30 per cent of Haryana and Jharkhand, 29 per cent of Maharashtra, and even 28 per cent of the farmers of Punjab – agriculturally one of the most developed regions and Kerala, one of the most developed states in terms of social development indicators of the country and Karnataka, and 30 per cent farmers of Haryana did not like agriculture occupation.

Farmers in Despair

Vagaries of monsoon added with rising costs and uncertainty of access to reliable technology, market and public credit institutions amidst unprotected risks with non-profitable agriculture aggravated the syndrome of frustration among farmers across the states of India irrespective of level of development of agriculture. Initially in the hope of getting favourable response farmers invested capital mobilising through public and private institutions and stayed in production for couple of years to make their fortunes. Richer lots of farmers could stay for couple of years because of their staying power and relatively better access to credit and inputs even if they suffered losses. Unfortunately many of them specially farmers from smaller farm size could not sustain growing burden of loans from moneylenders, traders, dealers of inputs for many years. Because of loss of face before the community consequent upon mounting burden of debts, failures of credit, insurance and procurement delivery mechanisms and agencies they were forced to commit suicides.

Various studies and reports have been conducted on this serious problem. IGIDR has brought a comprehensive study on suicides of farmers (Mishra 2006:41) for the government of Maharashtra. Study found various reasons for suicides. About 86.5 per cent suicides were because of indebtedness, 73.9 per cent for deteriorating economic status, and 40.5 per cent because of crop failures. Loss of face in community because of non-payment of loan, unable to marry their marriageable sisters and daughters, etc. About 91 per cent of suicides were committed by males. As per police record number of suicides in Maharashtra in 2004 alone was 4147. Study reported that number of suicides increased from 11866 to 14729 between 1995 to 2004.Study suggests that suicides in females registered decline after 1999. Another study (Mohanty, 2005) revealed that cash crop growers small and marginal farmers of Amaravati and Yavatmal districts were trapped in debt with an expectation to get better returns from cultivation and committed suicides.

Kisan Sabha estimates that more than 5,000 farmers committed suicide in Andhra Pradesh since 1998, more than 3000 committed suicide in Maharashtra, about 1,000 farmers committed suicide in Punjab from 1998 to the present, and about 5,000 committed suicide in Karnataka over the same period. It is estimated that 488 farmers

committed suicide in Wayanad District in Kerala between 2001 and 2005." (People's Democracy, vol.30, no. 09, Feb 26, 2006). Another study (Vidyasagar and Chandra, CSD, NIRD, 2003) argued that "The central issue of farmers' suicides is the debt trap. Small and marginal farmers, especially those, who lease in land from others, are not eligible for availing institutional credit and crop insurance. Thus, they land at the doorsteps of the usurious moneylenders. This debt trap is tightening because of the drastic shifts in the cropping pattern that is market driven." Seeds, fertilizer and pesticide dealers are at the centre of a growing controversy in Andhra Pradesh. They are the new moneylenders to a peasantry strapped for credit. "The banks have given no loans in the past seven years," says Malla Reddy, general secretary of the Andhra Pradesh Ryuthu Sangham (APRS). "So many farmers are forced to depend on sources like these for credit. The same man advises them on what to buy and then sets the rates for the purchase." With the seed dealers tacking on hefty interest rates to their credit sales, the problem gets sharper. Report of Nageswara Rao revealed to a charge of two per cent a month on bills, but says there was no choice. Times were bad. (The Hindu, September 11, 2005). Series of Reports from Sainath appeared in The Hindu is an eye opener for many of us.

The Decan Herald dated August 11, 2005 reported that Movement against State Repression (MASR) claims that about 40000 farmers committed suicides in Punjab alone since 1988 whereas state government admitted only 2116 cases. Rising cost of cultivation, lack of market security, exorbitant rate of interests charged by moneylenders, dishonouring contracts etc. were *inter alia* a few important reasons. After 1996 loan amounts increased four times but public institutions' share was merely 20 per cent. Nagesh Prabhu (2005) reported that most of the suicides were of debt driven. Delivery mechanism of institutional credit and its defined connivance with local middle men and functionaries often hatches conspiracy to confiscate land of the poor marginal and small farmers forcing them to commit suicide. Suicide committed by Manasa Ram of Maraucha Ishwari Singh Village of Suratganj Block in Barabanki district of Uttar Pradesh is an example of such cases. However, efforts of social activists foiled this conspiracy and confiscation got cancelled later.

Tenant farmers have seldom access to institutional credit in absence of ownership of land as collateral security and therefore they are forced to be trapped in usurious exploitative network. They often sell their crops at pre-decided price to the input dealers or at best at farm harvest price to petty traders. Kisan Sabha deliberated upon this serious crisis and noted: "While every such death is a tragic individual reality for grieving families and loved ones, there are important common features to the farmers' suicides. These farmers invested heavily in inputs – biological inputs, electricity, machinery, and other components of fixed and variable costs. These costs have risen sharply in the period of liberalisation, and are especially onerous when the farmer invests in seeds produced by private companies, particularly multinational corporations. The farmers were often the victims of plain cheating – they were sold spurious seed and other inputs by unscrupulous traders. Since 1991, farmers have had to witness the massive withdrawal of the formal sector of credit from the countryside, and have had to borrow from the informal sector at usurious rates of interest for their production and consumption needs. Finally, when they reaped a harvest, neo liberalism and the new trade regime robbed them of prices that could even cover their costs, let alone earn them a livelihood. Where the output itself is destroyed by pest, disease or natural disaster, the farmer was un-indemnified by any system of insurance, and inadequately compensated, if at all, by the state. It is the stark reality that, for many in our society and in such a situation, suicide appears as the alternative of last resort. "(People's Democracy, vol.30, no. 09, Feb 26, 2006).

Market driven farms diversification, not necessarily designed differently but for the interests of corporate sectors which exploited farms undermining ecological and fertility balance. Globalisation and new trade regime has made framers condition vulnerable and exposed to uncertainty (Vidyasagar and Chandra, 2003, CSD, NIRD). There is every possibility of worsening condition of poor farmers further with the emphasis on investment through corporate contract farming. Unless means of production is reoriented in favour of producers and meaningful employment and employability of poor cultivators are ensured through public sector initiatives for infrastructure development and input and output markets are regulated in the interest of producers it will be difficult to rescue farmers from the syndrome of distress and despair leading towards suicides.

IV Consolidation of Discussion and Policy Imperatives

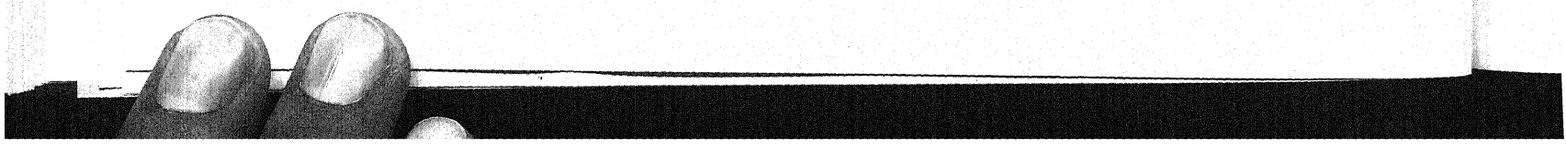
We have discussed that rural indebtedness widely spread across the states is a serious problem rooted in the syndrome of decelerating growth of agriculture amidst rising costs and inadequate infrastructure and deficiency of employment and income for the livelihood of rural workers specially cultivators and agricultural labourers. It emerged from the analysis that about 80 per cent of indebted households were from the poorest lot in terms of size of land possession and lower monthly per capita consumption expenditure. However, rate of indebtedness and amount of loan was directly related with increasing size of land possession and households with higher MPCE.

Major amount of loan utilized were for capital expenditure and current expenditure of farm and non-farm business. However, significant amount of loan was spent on essential consumption expenditure, marriage and other ceremonial occasions also. Expenditure on education and health was the least. So far sources of loan were concerned formal sector although provided 57.7 per cent of loan amount of which commercial bank remained the major player followed by cooperative societies. Institutional credit remained favourable for increasing size of land possessions but mostly in poor states. Banks remained effective after nationalisation until 1980s but its performance declined significantly in late 90s. Per hectare credit to agriculture was also declined. Moneylender was yet significantly present in the rural borrowing market to the tune of 25.7 per cent but other informal sources, i.e., traders, friends and relatives, professionals and others were not different than moneylenders with a few individual exceptions. Thus, informal sources altogether constituted 42.4 per cent.

Analysis suggests that the geneses of indebtedness were rooted in continued neglect of agriculture resulted in decelerated growth syndrome. Declining investment and inadequate infrastructure acted as a drag on institutional and technological transformation and modernisation with ecological balance. Poor support system for credit, input, insurance and marketing with dependence on vagaries of monsoon resulted in crop failures and lower returns leading to misery, distress and despair. In this syndrome cultivators were often not in a position to repay the loan and hardly sustained the loss of face before the community and committed suicides. Thus, most of the unfortunate suicides were debt driven. Debts Trap was the results of continued

neglect of the rural economy in terms of consecutive failures of effective policies and their implementation right from the redistribution of land to the tillers to accelerating growth with employment and justice. Instead of correcting those lapses the economy has been moving in a different direction in the interest of the rich and corporate sectors with a faster pace of reforms. Interestingly despite symptoms of all the negative indicators against the poor, contradictory policies for reforms have been put in place with a lip service to the poor. Unless poor producers are brought in the mainstream of production, control over the means of production and distribution on sustainable basis this process of marginalization, distress and despair which has emerged out of reforms and globalisation of markets, cannot be checked. Lowering the rate of interest on institutional loans and Right to Work may have soothing effects subject to effective implementation which is always doubtful. Right to Work on adhoc basis can not be continued for long. Sustainable employment generation led growth process for poor producers need to be put in place. This needs stronger and active role of State, which has been narrowing down during reform process. State has compromised with anti-poor development players. Therefore pro poor activism of civil society and effective mobilisation of peasants and social activists have become necessary to create pressure on State to perform pro-poor role to achieve growth with employment and justice.

****



DEVELOPMENT OF IRRIGATION IN UTTAR PRADESH : EXTENT AND DIMENSION – HOW STRONG AND HOW WEAK

By

SANATAN NAYAK

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

Development of Irrigation in Uttar Pradesh: Extent and Dimension

How Strong and How Weak?

Sanatan Nayak*

I. Introduction

Uttar Pradesh is the 4th largest state in terms of area and largest populated state in the country. However, more than 60 percent total working forces depend on agricultural sector and contributes 27 percent of the state domestic products (Government of India, 2003-04). The state occupies 1st position at all India level, so far as total irrigated area and total foodgrains production are concerned. However, nearly 90 percent of the total irrigated area is under foodgrains production. In Uttar Pradesh, the proportion of net irrigated area to net cropped area has increased from 36.12 percent in 1966-67 to 54.89 percent in 1980-81, again increased to 76.30 percent in 2001-02. The state claims as the third highest irrigated state (percent of net irrigated area to net cropped area) after Punjab and Haryana in the country. The state has prime position of being one of the major contributors to the agricultural performance in India. This has been happening because the state along with speed infrastructural development could reap the maximum benefits of green revolution. In addition, total fertilizer consumption has increased from 4.12 lakh tones in 1970-71 to 33.53 lakh tones in 2000-01. This has lead to increase the total foodgrains production from 169.78 lakh tones in 1970-71 to 424.97 lakh tones in 2000-01 and the productivity has also increased from 1015 kg/hectare in 1970-71 to 2104 kg/hectare in 2000-01. In other words, total foodgrains production increased by 2.13 times, the yield of rice increased by 2.31 times, total production of cereals increased by 2.31 times during 1970-2003 due to intensive use of land, chemical fertilisers, introduction of HYV seeds and associated inputs.

The general belief that intensive use of land along with agricultural inputs has reached at a saturation point and started declining or remained constant after a certain point. However, the productivity of some major crops has increased up to the nineties and started declining or

* Fellow, Giri Institute of Development Studies, Lucknow. E-mail: sanatan5@yahoo.com

remained constant during nineties in the state. During nineties, the productivity of rice remained constant till 1995-96 and started increasing slowly for another two years and again started declining. The performance of wheat remained almost constant during this period and started declining in few years. However, potatoes shows marginally positive trend during nineties. The trend of cereals, foodgrains showed an uneven trend, whereas groundnut, oilseeds and sugarcane shows a clear decline of productivity in the nineties. In toto, none of the major crops depicted here reveals a clear positive trend during 1991-2001. The productivity trend for all the crops shows either constant or declining during the same period.

During the last three decades, some of the findings were emerged in Uttar Pradesh. Firstly, rice is the only crop under cereal, potato and sugarcane under non-foodgrains showed continuous positive growth in output, whereas barley, gram, groundnut, cotton revealed continuous negative growth throughout the green revolution period. Moreover, CAGR of rice has been declining during 1991-2001 over the previous two decades of the green revolution period, which happened due to declining of both area and yield growth rate. Secondly, *barley*, *bajra* and maize under coarse cereals, turmeric under non-foodgrains started accelerating in the eighties with a slow growth at the beginning of the green revolution period, whereas tobacco performed substantially lower after eighties with a better performance in the seventies. Thirdly, there was dramatic transition from negative to high growth of production in the oilseeds and total pulses during seventies to eighties and again declined in nineties.

II. Growth of Irrigation in the State

The declining or constant trend of major crops in recent years in the state is largely depending on the performance of the irrigation sector as irrigation covers nearly 75 percent of the net sown areas. However, the net irrigated area has increased from 62.55 lakhs hectares in 1966-67 to 94.53 lakh hectares in 1980-81 and again increased to 128.28 lakhs hectares in 2001-02. The proportion of net irrigated area to net cropped area has increased from 36.12 percent in 1966-67 to 54.89 percent in 1980-81, again increased to 73.70 percent in 2000-01 and 76.30 percent in 2001-02. Moreover, the net irrigated area by private sources such as private tubewell/pump sets constitute nearly 87.09 lakh hectares, which is 68 percent of the net

irrigated area, whereas major and medium sources through canal irrigation possesses at 27.19 lakh hectares, which is nearly 21 percent of the net irrigated area in the same year. The canal irrigation has increased continuously up to 1985-86, after that showed constant trend till 1995-96. Beyond 1995-96, the expansion of canal irrigation shows a continuous declining trend. It is observed that there has been disproportionate growth of irrigation by sources during the study period in the state. The growth rate of net irrigated area shows continuous positive growth in all sub-periods, where as it has declined from 2.70 percent in seventies to 0.80 percent in eighties and marginally increased to 1.30 percent in nineties. However, the growth of net irrigated area is mainly supplemented by a continuous positive growth in private tubewell in all the sub-periods (Table 1). On the other hand, growth of canal irrigation shows a dismal performance, as it declined from 2.60 percent in seventies to -0.70 percent in eighties and again declined to -1.80 percent in nineties. However, the proportion of other forms irrigation is not much significant. It is clear that growth of net irrigation in nineties is lower than that of seventies.

Table 1: CAGR of Area under various forms of Irrigation in Uttar Pradesh during 1970-2003

Irrigation systems	1970-71 to 1980-81	1980-81 to 1990-91	1990-91 to 2002-03	1970-71 to 2002-03
Canal	2.60*	-0.70***	-1.80*	0.40**
Tubewell	8.30*	2.50*	2.80*	4.20*
Other Tubewells	-16.30**	-6.80*	3.00***	-3.40*
Tanks	-7.70*	-5.40*	0.30***	-5.20*
Others	0.70	0.80	-13.30	-1.20*
Net Irrigated Area (NIA)	2.70*	0.80*	1.30*	1.90*
Irrigation Intensity	-0.20	2.30*	-0.10	0.90*
Gross irrigated area	2.80*	3.00*	1.5*	1.5*

Source: Various Volumes of CMIE.

The decline of productivity is mainly due to decline of gross irrigated area, though there has been marginal increase of net irrigated area. The gross irrigated was increased from 52 lakh hectares in 1950-51 to 84 lakh hectares in 1970-71. However, it was increased again 148 lakh hectares in 1990-91. The trend of gross irrigated areas become uneven during nineties, as there is no clear positive trend during the same period. However, both gross

irrigated area and net irrigated area have been remaining constant or declining during 1998-99 to 2002-03, as the canal irrigation was declining constantly during the same period.

The trend of gross irrigated area is supplemented by irrigation intensity of the state. However, irrigation intensity depends on the irrigation areas in kharif, rabi and zaid seasons. Out of 160 lakhs gross irrigated area, irrigation in kharif season constitute nearly 54 lakhs, irrigation in rabi season constitute nearly 100 lakh hectares, whereas irrigation in the zaid season is having 6 lakhs only in 1992-93. Where as, the gross irrigated area increased to 182 lakh hectares in 2001-02. Out of 182 lakh hectares, irrigation in kharif season constitute nearly 68 lakhs, irrigation in rabi season constitute nearly 108 lakh hectares, whereas irrigation in the zaid season remain constant at 6 lakhs only during 2001-02. Moreover, out of 168 hectares of net sown area, only 108 lakhs hectares are irrigated in the rabi season. Hence, there is plenty of scope to increase the net irrigated area under crops in the rabi season by canal as well tubewell irrigation. It has been observed that irrigation area under zaid season remains constant or marginal increase during the last 10 years. Hence, due to slow increase irrigation intensity causes slow progress of gross irrigated area make slow growth of total production, that eventually makes the productivity trend constant or decline. Therefore, it may attribute here that there is lot scope to increase the potential for irrigation in the and rabi and zaid season through both canal and ground water extraction in under exploitated areas of the state.

The private and public irrigation is broadly classified under groundwater, minor surface irrigation, and major and medium canal irrigation. Groundwater irrigation mainly used both by private and public tubewell, shallow tubewells, dugwell and deep tubewells. However, minor surface irrigation is mainly by both public and private sector consists of the development of tank irrigation, reservoir, lake etc. Finally, major and medium irrigation (canal irrigation) is mainly developed by public sources through the construction of dams over the rivers. It is urgently felt the role of both private and public sector irrigation under these major sources at the national and state level.

It is observed that the share of canal irrigation (both major and medium irrigation) and surface minor irrigation has declined on the one hand and the share of ground water irrigation (private and public) has increased drastically on the other hand. As a consequence of the use of large number of private tubewell and state tubewell, the irrigated area under tubewell has increased from 23.30 lakh hectares (32 percent of the net irrigated area) in 1970-71 to 91.58 lakhs hectares (72 percent of the net irrigated area) in the state during 2001-02 (Table 2). It is reflected that tubewell irrigation is the dominant form of irrigation among all types of irrigation as it has its own advantages. This has been resulted due to the introduction of free boring scheme, which recommended heavy doses of subsidy for the development of groundwater in the state. Under the programme, free boring facility to the extend of Rs. 3000 was provided to small and marginal farmers. Additionally, subsidies of 33.3 percent and 50 percent were provided to small and marginal SC and ST farmers respectively for the purchase of electric or diesel pumps (Pant, 2004: 2005). As a result, the number of both diesel and electric pumps sets has increased 17.63 lakhs in 1990-91 to 37.76 lakhs in 2004-05. This has been resulted to increase the share of private irrigation from 54 percent in 1970-71 to 75 percent in 2001-02 on the one hand and sharp decline of the share of public irrigation from 45.82 percent in 1970-71 to 24.70 percent in 2001-02.

Table 2: Development of Various types of Irrigation in Uttar Pradesh (in lakh hectares)

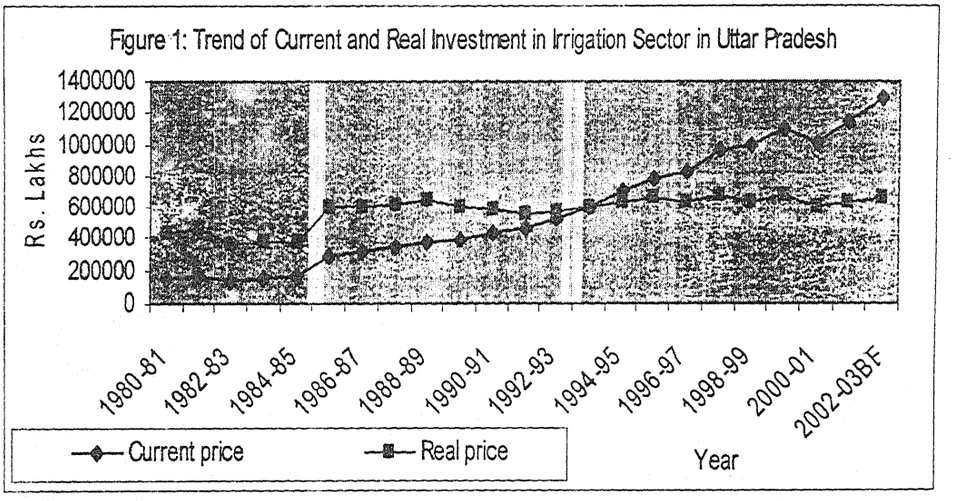
Year	Canal (Major and Medium)	Tubewells (Groundwater)	Minor surface	Total Public	Total Private	Total
1970-71	24.98 (34.60)	23.30 (32.28)	23.91 (33.12)	33.07 (45.82)	39.11 (54.18)	72.18 (100)
1980-81	31.78 (33.62)	50.53 (53.45)	12.22 (12.93)	31.78 (72.23)	12.22 (27.77)	44.00 (100)
1990-91	31.93 (30.29)	65.63 (62.26)	7.86 (7.46)	39.04 (37.04)	66.38 (62.96)	105.42 (100)
2000-01	27.49 (22.17)	89.42 (72.11)	7.09 (5.72)	33.40 (26.94)	90.60 (73.06)	124.00 (100)
2001-02	27.19 (21.20)	91.58 (71.39)	9.51 (7.41)	31.68 (24.70)	96.60 (75.30)	128.28 (100)

Source: Various volumes of Statistical Dairy, Government of Uttar Pradesh.

III. Trend of Investment in Irrigation

(a) Inadequacy of Public Funds

The share of pubic investments in irrigation sector compared to power and transport has declined over various five year plans. However, the expenditure on irrigation and flood control was declined from 22 percent of the planned expenditure during 6th plan to nearly 12 percent during 9th and first three years of the 10th plan (Government of UP, 2004-05). Though, total public investment in absolute terms in irrigation has increased continuously during 1980-81 to 2002-03 with the exception of few years, yet the real investment has remained constant since mid-eighties till late nineties and declined in the recent years (Figure 1). †



However, considering the distribution of public funds among the sub-sectors of irrigation, construction of medium and major irrigation takes a lion share up to 83.81 percent during the 9th plan and it is anticipated to rise up to 84.45 percent by the end of 10th plan. On the other hand, the public investment on minor irrigation has declined drastically from 34.30 percent in 1985-86 to 6.57 percent in 2002-03 (Table 3). However, development of command area is considered an important sub-sector of irrigation, which helps in maintaining the already achieved irrigated lands effectively. Unfortunately, the share under command area development (CAD) is

† Real investment is estimated by deflating the ratio of current and constant NSDP with the current investment in irrigation sector.

restricted to 5-6 percent and it declined to nearly 4 percent during first three of the 10th plan. It shows the irrigation establishments have an overwhelming bias towards designing and construction of projects without commensurate concerns and budgetary share on the utilization of the potential created, operation and maintenance of the project completed. It is clearly observed that nearly 80 percent of public investment is made on major and medium irrigation, which ultimately irrigate only 31 percent of the total irrigated area (rest 69 percent is groundwater and minor surface irrigation). Moreover, 4 percent of the public investment is meant for the overhead and maintenance of total canal irrigated area. Hence, there may be rethinking of diversification of public investment in favour of development of minor irrigation in the non-canal and under developed regions in the state as well as on CAD of the canal irrigated area.

Table 3: Expenditure on Various types of Irrigation during 7th plan to 10th five year plan in Uttar Pradesh (Rs. Lakhs)

Years/ Plans	Major & Medium Irrigation	Minor Irrigation	Command Area Development	Flood Control	Total
1985-86	20004 (61.34)	11185.83 (34.30)	1211.71 (3.72)	212.41 (0.65)	32613.95 (100)
1986-87	23814 (62.20)	12225.29 (31.93)	2148.32 (5.61)	96.04 (0.25)	38283.65 (100)
1987-88	24995 (61.44)	13091.93 (32.18)	2359.63 (5.80)	238.01 (0.59)	40684.57 (100)
1988-89	30357 (56.84)	12995.95 (24.34)	2120.17 (3.97)	7930.92 (14.85)	53404.04 (100)
1989-90	25331 (56.95)	15755 (35.42)	1285.98 (2.89)	2105.83 (4.73)	44477.81 (100)
7th plan (1985-90)	124501 (59.44)	65254 (31.15)	9125.81 (4.36)	10583.21 (5.05)	209464.02 (100)
1992-93	28474 (72.44)	8312.43 (21.15)	1623 (4.13)	900 (2.29)	39309.43 (100)
1993-94	30900 (77.50)	5948.66 (14.920	1971.91 (4.95)	1050 (2.63)	39870.57 (100)
1994-95	30079 (73.76)	6629.84 (16.26)	2826.32 (6.93)	1246 (3.06)	40781.16 (100)
1995-96	37300 (75.33)	8776.97 (17.73)	2193.76 (4.43)	1246 (2.52)	49516.73 (100)
1996-97	40392 (63.75)	18709.81 (29.53)	2009.2 (3.17)	2250.24 (3.55)	63361.25 (100)
8th plan (1992-97)	167146 (71.75)	48377.66 (20.77)	10624.19 (4.56)	6793.24 (2.92)	232941.09 (100)
1997-98	47387	8115.52	3057.8	1140	59700.32

	(79.37)	(13.59)	(5.12)	(1.91)	(100)
1998-99	44840	8473.62	2514.63	2512.61	58340.86
	(76.86)	(14.520	(4.31)	(4.31)	(100)
1999-2000	63416	994.49	4249.53	4087.39	72747.41
	(87.17)	(1.37)	(5.84)	(5.62)	(100)
2000-01	74198	5930.11	2876.96	3111.35	86116.42
	(86.16)	(6.890	(3.34)	(3.61)	(100)
2001-02	71617	6102.26	2831.12	2229.94	82780.32
	(86.51)	(7.37)	(3.42)	(2.69)	(100)
9th plan (1997-2002)	301458	29616	15530.04	13081.29	359685.33
	(83.81)	(8.23)	(4.32)	(3.64)	(100)
2002-03	82481	7026	3000	3853	96360
	(85.60)	(7.29)	(3.11)	(4.00)	(100)
2003-04 (proposed)	92231	6982	3000	4053	106266
	(86.79)	(6.57)	(2.82)	(3.81)	(100)
X Plan (2002-07)	642458	53527	40000	24750	760735
	(84.45)	(7.04)	(5.26)	(3.25)	(100)

Source: Various Annual Plan Documents, Government of UP.
Note: Values in the Parenthesis are percent of the total

(b) Non Judicious Allocation of Funds within O & M Cost

It is observed that not only the public investment on command area development (O & M costs) to maintain the existing irrigation sector is highly low but also the allocation among sub-sectors is non-judicious. The share of operation costs (direction and administration) has been increasing over the years touching up to 82 percent in 2000-01 on the one hand and the share of maintenance and repairing (M & R) has been declining up to 11 percent 2002-03. However, considering the entire period 1986-87 to 2002-03, the share on operation costs goes alone more than 50 percent and it declines to 28 percent on M & R over the years in the state. Most importantly, the share of direction and administration cost out of total O & M costs has been increasing on the one hand and share of M & R costs is being declining (Table 4). It means a substantial part of the expenditure earmarked for O & M costs, goes to meet the expenditure on the staffs in the irrigation department leaving very little for maintenance and repairing work in the state. The diversification of fund within the O & M costs looks unfavorable and non-judicious for the sustainability of the irrigation systems. However, physical sustainability of a huge infrastructure like irrigation is very much dependant on judicious budget allocation. The un-favorable and non-judicious budget allocation on

maintenance and repairing activities is also mainly due to low cost recovery ratio through water tariff.

Table 4: Trend of Revenue and O & M Costs of Irrigation Sector in Uttar Pradesh

Year	M & R		Energy		Operation		O & M Costs	Revenue	
	Per hectare (Rs/ha)	Percent to O & M	Per hectare (Rs/ha)	Percent to O & M	Per hectare (Rs/ha)	Percent to O & M	Per hectare (Rs/ha)	Per hectare (Rs/ha)	Percent to O & M
1986-87	67.64	68.05	13.21	13.29	18.55	18.66	99.40	97.13	97.72
1987-88	52.16	26.06	38.67	19.32	109.34	54.63	200.17	39.54	19.75
1988-89	93.03	35.56	55.01	21.03	113.58	43.41	261.62	65.32	24.97
1989-90	94.71	32.77	38.36	13.28	155.92	53.95	289.00	91.39	31.62
1990-91	114.63	38.77	19.79	6.69	161.25	54.54	295.66	73.17	24.75
1991-92	113.53	22.62	114.96	22.90	273.51	54.48	502.00	77.95	15.53
1992-93	107.15	27.17	112.57	28.55	174.58	44.28	394.30	92.85	23.55
1993-94	116.45	26.32	101.99	23.05	224.07	50.64	442.51	316.63	71.55
1994-95	125.39	29.13	96.45	22.41	208.58	48.46	430.42	131.45	30.54
1995-96	131.39	42.34	136.28	43.91	42.66	13.75	310.33	208.65	67.24
1996-97	167.46	23.33	100.54	14.01	449.84	62.67	717.84	191.35	26.66
1997-98	112.16	39.16	118.42	41.34	55.85	19.50	286.43	90.83	31.71
1998-99	127.94	16.05	131.12	16.45	538.28	67.51	797.35	99.13	12.43
1999-2000	130.59	10.57	185.78	15.04	918.88	74.39	1235.25	91.67	7.42
2000-01	188.91	13.27	53.48	3.76	1181.17	82.97	1423.56	735.02	51.63
2001-02	168.28	11.98	192.72	13.72	1043.67	74.30	1404.68	199.67	14.21
2002-03	167.21	11.34	191.49	12.99	1115.41	75.67	1474.10	441.76	29.97
Average	122.27	27.91	100.05	19.51	399.13	52.58	621.45	179.03	34.19

Source: Estimated from Various Volumes of Aaya-Vyayak Digdarshak, Irrigation Department, and Government of Uttar Pradesh.

Note: O & M Costs are estimated excluding Interest and Depreciation charges

(c) Thin Spread of Investment

Another biggest single malady in the major and medium irrigation sector right from first plan has been the continued tendency to start more and more new projects resulting proliferation of projects recklessly, which lead to thin spreading of resources and consequent time and cost overruns (Government of India, 2002-07). In the state, 8 projects were started in the 5th five year plan and not yet completed to utilize its full potential. Similarly, some were started in late 70's and 80's could not completed till yet (Government of India, 2002-07). The benefit yet to realize is also quite large for these projects. Moreover, this problem resulted in escalation of costs in many folds. For example, the original costs of Saryu Nahar in 5th plan

was Rs.78.68 crores and the latest costs was increased up to Rs.1256 crores by the end of 9th plan. Hence, it is essential to complete the on going projects in order to avoid the problem of costs escalation and achieving quick results.

IV. Environmental Problems

Waterlogging and Salinity

It has been observed that waterlogging and salinity is one of the major forms of land degradation in the fertile irrigated land. However, the irrigated induced waterlogging (consequently converts into salinisation) is mainly due to poor or mismanagement of the existing canals. The poor or mis-management of existing huge infrastructure like irrigation sector suffers due to inadequacy of public funds (decline or constancy of real investment), non-judicious allocation of public funds among the irrigation sub-sectors (especially lower investment for maintenance), poor cost recovery ratio through water rates, low involvement of users in the management of water. All the factors individually or jointly weaken the irrigation sector, eventually makes the irrigated land waterlogged and salinisation.

Groundwater Depletion

The most important way of examining the over/under exploitation of groundwater is to measure the water table in a particular period in different areas of the state. However, Ground water department, Government of Uttar Pradesh categories, when the water table goes down between 5m to 10m below the ground level, area is considered as safe zone. Moreover, when the water level goes down between 10m to 15m and below, the area is considered as semi-critical and critical zone respectively (Government of UP, 2003). According to the Third Minor Irrigation Census Report, out of 99, 472 villages surveyed in 2000-01, nearly 32 thousand villages (nearly 32 percent) are under semi critical and critical ground water level zone (Table 5). It may be attributed here that rest two third of the villages are under water logging zones or save zone. Under the critical zones, the groundwater level in 7.74 thousand villages is within 15 to 25 meters and 8.18 thousand villages are within 25 to 70 meters, where further extraction of ground water is almost impossible.

Among various regions, nearly 40 percent of the villages are under semi-critical and critical level in Western region of the state (Table 5). Some of the districts, viz., Auraiya, Etawah, where all the surveyed villages are under critical level. Some of the other districts, viz., in Agra 69 percent, in Baghpat 50 percent, in Firozabad 67 percent of the villages are under critical level. As Bundlekhand region belongs to naturally disadvantages position, nearly 2371 villages (49 percent) are under critical level. In Banda, Chitrakut, Hamirpur, where more than 70 percent of the villages are under semi-critical and critical level, where as nearly 50 percent of the villages are under semi-critical and critical region in Jalaun. In the Central Region, nearly 5 thousand villages (32 percent) are under semi-critical and critical region. On the one hand, Kanpur rural has 76 percent of the villages under semi-critical and critical level, whereas Sitapur has no villages under such situation. Eastern region of the state is the least affected regions, so far as ground water exploitation is concerned. However, nearly 12 thousand villages (25 percent) are under semi-critical and critical level. However, Azamgarh, Kaushambi, Sant Ravidas Nagar and Varanasi are some of the over exploitated ground water regions. It may be attributed here that this region is abundant with the availability of water resources and mostly affected by waterlogging.

Table 5: Villages based on the Ground Water Level in the State in 2000-01 (in Nos.)

Regions	Waterlogging and Save Zone <10 mtr	Semi-Critical level 10-15 mtr	Critical Level 15-25 mtr	Over exploitation 25-70 mtr	Total
Western Region	18766 (60.60)	5748 (18.56)	2644 (8.54)	3808 (12.30)	30966 (100.00)
Central Region	9817 (66.27)	2603 (17.57)	1491 (10.06)	903 (6.10)	14814 (100.00)
Bundlekhand Region	2516 (51.48)	1279 (26.17)	544 (11.13)	548 (11.21)	488 (100.00)
Eastern Region	36487 (74.76)	6321 (12.96)	3068 (6.29)	2929 (6.00)	48805 (100.00)
Uttar Pradesh	67586 (67.94)	15951 (16.04)	7747 (7.79)	8188 (8.23)	99472 (100.00)

Source: 3rd Census, Minor Irrigation, Government of Uttar Pradesh.

Note: Values in the parenthesis shows the percentages of villages to the total villages under different category.

Increase of Fallow lands

The declining state of the major crops in recent years may be attributed due to the increase of fallow land (consisting both current fallows and other fallows) in the state. However, it is noticed that the total fallow land has been increasing over the years since early sixties. Nearly 6 lakh hectares of fallow land has increased during the 40 years in the state. Moreover, due to government efforts, the area under fallow land has declined to 16. 5 lakh hectares in 2000-01(Table 6). The fallow land occurs due to waterlogging and salinity. Hence, control of waterlogging and salinity needs serious efforts to enhance the productivity of major crops in the state.

Table 6: Land use Pattern in Uttar Pradesh (in Lakh hectares)

Items/ Year	1950-51	1960-61	1970-71	1980-81	1990-91	1995-96	2001-02*
Fallow land (1+2)	13.68 (6.44)	13.86 (4.71)	14.14 (4.74)	18.86 (6.34)	19.86 (6.67)	20.05 (6.73)	16.5 (6.82)
1. Fallow other than current fallows	2.91 (1.37)	12.13 (4.13)	5.45 (1.83)	7.16 (2.41)	8.84 (2.97)	8.56 (2.87)	6.24 (2.58)
2. Current fallows	10.78 (5.07)	1.54 (0.53)	8.70 (2.92)	11.70 (3.93)	10.84 (3.64)	10.76 (3.61)	10.26 (4.24)

Source: Statistical Abstract and Statistical Dairy, Various Volumes.
Note: * Data for 2001-02 are reported after the separation of Uttaranchal. Values in the parenthesis are percent of the total reporting area.

V. Subsidy and Water Rates

Canal Irrigation

The cost recovery through water tariff is highly low, outdated and quite burdensome on the irrigation department. It has declined to the lowest up to 7 percent of O & M costs in 1999-2000 and remained at nearly 34 percent on an average basis during 1986-87 to 2002-03 (Table 4). In other words, when the average O & M costs is Rs. 621, only Rs. 179 is recovered through revenue collection during the period. Therefore, the financial health of this sector is becoming weak and the authority is facing serious financial crunch for is O & M. Various reasons are important for low cost recovery ratio, such as the prices are fixed in nominal terms and are not revised for years, the pricing structure is based on crop area irrigated and not on volume of water consumed, there is hardly any link between the agency levying water charge

and the agency that collects it, the cost of collection is itself high due to over-staffing (Gulati, et al, 2005). Unless these problems are sorted out, there is hardly any chance of recovering the financial health of the sector. Moreover, poor maintenance and low cost recovery is also dependant on peoples' participation in the management of irrigation sector.

Minor Irrigation

The pricing of water by pump sets such as electrified or diesel looks costlier from farmers point of view compared to canal irrigation. However, this practice has been discouraging the small and marginal farmers to irrigate their land. In other words, Government efforts to supply free/subsidies boring and pump sets is not enough to irrigate up to the highest level of potential. The Ground Water Department, Government of Uttar Pradesh has estimated that the cost involved for irrigating one hectare for one season by the hired diesel pump set varies from Rs. 2400 to Rs. 3200 at the rate of Rs. 30 to Rs.40 per hour (Government of UP, 2006). Similarly, the cost involved for irrigating one hectare for one season by the owned diesel pump set varies from Rs. 1800 to Rs. 2400 at the rate of Rs. 22.5 to Rs.30 per hour. On the other hand, the cost involved for irrigating one hectare for one season by the electrified pump set varies from Rs. 1200 to Rs. 1440 at the rate of Rs. 15 to Rs.18 per hour. If three crops are irrigated per annum, the cost of irrigation by hired diesel pump sets varies from Rs.7200 to Rs. 9600, owned diesel pump sets varies from Rs. 5400 to Rs. 7200 and electrified pump sets varies from Rs. 3600 to Rs. 4320. However, it looks vary costly from farmers point of view compared to canal irrigation. In the canal irrigated farmers has to pay Rs. 600 per hectare per annum. Hence, it may be attributed here that in the case of canal irrigation, government is under paid for O & M of the system on the one hand and in case of private pump sets irrigation is costlier, which may discourage the small and marginal farmers.

VI. Participatory Irrigation Management

This problem can be surpassed by encouraging the participation of users or user groups in the management of the systems on the one hand and de-bureaucratizing and depoliticizing on the other hand, in order to achieve the objective of improving the efficiency of water uses vis-à-vis crop productivity by applying various instruments. Experience shows in Andhra Pradesh, Maharastra, Madhya Pradesh and Gujarat that Participatory Irrigation Management (PIM) not

only enables to improve the O & M of irrigation systems (increasing the efficiency of water uses), but also reduce the fiscal deficit of the government either by reducing the expenditure on irrigation or by increasing collection by bringing additional resources (cash or kind).‡ The efficiency of irrigation water can be developed possible by two critical factors, i.e., level of water users' organization and changes in the collection of irrigation fees. The former is necessary for better way of managing water resources, O & M of the systems by the users' and the latter is essential for reduction of state's fiscal deficit either through increase in revenue collection or participation by the user in term of labour. Both can be possible by adopting participatory approach by the users. PIM has been adopted at the centre at different level since mid-seventies, while the level of success differs widely among state as water is a state subject. In toto, Though Uttar Pradesh Government has taken some encouraging steps in terms of institutional and legislative reforms at various levels to ensure the implementation of PIM, yet the activities is at the elementary stages to achieve the objective.

VII. Conclusions and Policy Recommendation

There have been strong linkages between irrigation along with fertilisers and modern technology with agricultural growth vis-à-vis economic development of the country. However, sustainable growth of agricultural sector depends on the proper management of irrigation sector both environmentally and institutionally. The irrigation sector in Uttar Pradesh suffers from low and non-judicious allocations of public investment, which ultimately lead to poor maintenance of the public irrigation system. As a consequence, irrigation induced waterlogging and salinity increased on the one hand and heavy use of tubewell leads to groundwater depletion on the other hand in other areas. This lacks proper conjunctive use of irrigation in the canal as well as non-canal command areas. However, the proportion of public irrigation is being declining on the one way and private tube well irrigation is being increasing on the other way. The pertinent question comes in this regard. Can the groundwater irrigation substitute totally to the canal irrigation? It has many implications. Canal irrigation acts as a recharging mechanism and saves from groundwater

‡ For details see Oblitas, K, et al 1999 for the success story of Andhra Pradesh, India

depletion in the dry areas. On the other hand, groundwater irrigation helps to reduce waterlogging problems in the canal command areas. Both act as complimentary mechanism to each other. Hence, proper policy in financial, institutional and legislative aspects is needed for the survival of the system. Moreover, proper conjunctive use of irrigation, involvement of users in the management of irrigation system, judicial allocation of public funds in sub-sectors of irrigation and increasing cost recovery ratio can help in surviving the irrigation sector for a longer period, which would ultimately bring higher sustainable agricultural growth.

References

Government of India (2002-07), *10th Five Year Plan, Vol.II,* Planning Commission, New Delhi.

----------, (2003-04), Statistical Abstract of India, Department of Planning, New Delhi.

Government of Uttar Pradesh (2003), *National Symposium on Water Resources Management and Development with Reference to Ganga Basin,* Irrigation Department, Government of Uttar Pradesh.

----------, (2004-05), *Annual Plan (2004-05),* Vol. I, Part II, State Planning Commission.

----------, (2006), *Recovery of Waterlogged Areas in UP*, in Collaboration with UP State Land Use Board and IIPA, UP.

Gulati A.; Ruth Meinzen-Dick; K.V. Raju (2005), *Institutional Reforms in Indian Irrigation,* Sage Publication, New Delhi.

Oblitas K.; J. Reymond Peter, 1999. 'Transferring Irrigation Management to Farmers in Andhra Pradesh, India, The World Bank, Washington D.C.

Pant, N. 2004. 'Trend of Groundwater Irrigation in Eastern and Western Uttar Pradesh', *Economic and Political Weekly*, Vol. 39, No.31, July 31.

Pant, N. 2005. 'Control of and Access to Groundwater in Uttar Pradesh', *Economic and Political Weekly*, Vol. XL, No.26, June 25.

TRADE COMPETITIVENESS OF WHEAT AND RICE : A CASE STUDY OF UTTAR PRADESH

By

YOGESH BANDHU ARYA

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



TRADE COMPETITIVENESS OF WHEAT AND RICE: A CASE STUDY OF UTTAR PRADESH

Yogesh Bandhu Arya*

Agriculture in India is the most important segment of the economy. Growth of Agricultural sector is crucial for Indian economy as it employs two-third of its population and contributes nearly one-third of national income. It is important for achieving a number of development goals as enhancing overall economic growth and poverty reduction, improving food security, and conserving natural resources. Agriculture is also one of the major sources of export earnings of our country and is crucial for improving the balance of payments. In recent years, the export of agricultural and allied products accounted for about one-fifth of total export earnings of India. The performance of agricultural export depends not only on adequate surplus, international prices, quality of product, market competition and comparative advantage of producing the exportable commodities but also on domestic and international trade policy. India's share of agricultural export has remained very low in many commodities despite inherent strength of Indian agriculture with the exception of few commodities. A number of Indian sates are still an agricultural economy. Therefore it is alarming for that state which has largely dependent on agriculture sector.

Present paper is an effort to evaluate competitiveness of wheat and rice of Uttar Pradesh in international market. Since agricultural trade is highly distorted due to huge subsidies and support to agriculture in developed countries; paper also evaluate competitiveness of these commodities in alternative case if both countries withdraw their subsidies to these commodities in form of Producer Support Estimate (PSE). The Paper is divided in four parts; Part one is about the methodology to calculate competitiveness. Trade competitiveness of wheat and rice at present prices and at PSE adjusted prices has been calculated in part two. Part three evaluate the motives behind huge support to agriculture in developed countries. Part four is concluding component.

* Doctoral Fellow of Indian Council of Social Science Research at Giri Institute of Development Studies, Lucknow

(I)

There are so many factors which constraints agricultural export from India. Colossal subsidies and support given to agriculture in developed countries is one of a major cause which makes agriculture commodities of Indian states non-competitive in international market. Agriculture has inter-alia two-fold important phenomena - production and marketing. These are governed by different sets of attributes; production is a function of material, financial inputs and labour, while marketing is an act of exchange of products for money or fulfilling other requirements. Hence price mechanism becomes important for production behavior and exchange processes. Emergence of World trade Organization has an effective impact on development of agriculture sector. There are the potential gains from the strengthening of a rules-based global trading system for agriculture and reducing distortions in global agricultural markets. Developing countries are the weaker players in the trading system, and thus will benefit the most when the dominant trading countries play by common rules that discipline government activities supporting agriculture in the three key areas of domestic support, market access, and export competition. But the experience of 10 years of WTO regime witnessed that trade in agricultural commodities is most distorted due to huge support and subsidies by developed countries. Vast subsidies in different forms i.e. direct support to producers, product specific support, input subsidies, export subsidies etc has large bearing on prices of agricultural commodities and therefore hampering the trade competitiveness of developing countries.

Trade competitiveness is a dynamic phenomenon, which would vary depending upon the changes in international and domestic prices consequent upon demand and supply of commodities and market condition. Opening-up of international Agricultural trade increases international competition. In open market, the producers of price effective commodity lead competition subject to direct and indirect support/subsidies. Volatility in international prices arising out of inter year fluctuations has serious implication for India's export competitiveness of agricultural commodities. Trade competitiveness basically depends upon the level of domestic prices relative to international prices. In its simplest form trade competitiveness, say export, can be measured by comparing domestic prices with international price expressed in domestic prices net of freight, transport and

related costs involved in taking produce from exporting country to importing country. If domestic price of any commodity is lower than the net export price then the commodity is export competitive otherwise it is not export competitive. Similarly under importable scenario, if domestic price is lower than international price plus transportation, freight, insurance and other cost involved in taking produce from foreign market to domestic market then domestic produce is import competitive otherwise it is not import competitive. The simplest indicator of domestic protection and export competitiveness is Nominal Protection Co-efficient (NPC).

Methodology:

Nominal protection coefficient is measure by the ratio of domestic prices to international prices. NPC greater than one indicate effective incentive to producers compared to free trade scenario and NPC lower than unity indicates that commodity is dis-protected. Similarly, NPC<1 indicate the commodity is exportable and NPC>1 indicates the commodity is importable.

The domestic prices used in the estimation of nominal protection are intended to approximate by producer prices (FHP) of fair and average quality (FAQ) of wheat and rice that the farmers receive during the harvest[1]; compiled by FAO data archive. One can use other alternative variant of prices available in India i.e. Minimum Support Prices and Wholesale Prices. Logically speaking MSP<FHP<WP[2]. In this paper trade competitiveness of wheat and rice from Uttar Pradesh[3] has been compared with U.S wheat and rice, therefore F.O.B. prices of wheat and rice at U.S. gulf port has been taken for international prices. A reference price has been defined as what the prices of the domestic varieties would have been during the same period under conditions of free trade at the same exchange rate.

There can be substantial differences between the prices of different varieties and grades of a commodity; keeping this in view care has been taken to specify which is to use for price comparisons. For international prices of wheat US Hard winter No.2 (Gulati,

---

[1] Farm Harvest Prices is that the farmers receive during six to eight week after harvest.
[2] Diwakar (1993)
[3] Barely and Varanasi markets has been selected as export point of Rice and Wheat respectively from Uttar Pradesh. These markets are selected on behalf of size of market, market arrivals, and variety of particular commodity etc.

et.al, 1991; Chand, 2001), West Red Spring No.1 (Diwakar, 1993), are considered. There are several kinds of international prices quoted for different verities of rice, i.e. Diwakar (1993) used Thai Cargo – second grade which is normally 13 per cent Broken, however, Gulati et.al. (1991) used Thai – White, 5per cent broken rice. Here U.S. Hard winter No.2 verity of wheat has been considered. For rice, FOB price of Thai – White, 5per cent broken rice; which is flaky and long slender grain in quality has been considered.

The market for competition is considered: Tunisia, which is almost equally distance from India and U.S. In estimating the nominal protection indicators of farm commodities, transport and other related costs - both international and domestic - can make a very large difference. International transport costs provide a degree of protection for domestic producers against imports, whereas in exporting the domestic producer's price must be low enough to make the product competitive in foreign markets, including transport cost to the market. Consequently, the observed domestic price of a commodity may well be lower than the import reference price, while at the same time substantially exceeding the price that would have to be charged to capture export markets.

Similarly, domestic transport costs provide additional protection to production in inland areas, but on the other hand reduce the prices that producers would receive if they were competing with imports at a port city, or if they were exporting. The importance of transport costs depends on a variety of factors, including the location of foreign suppliers of imports and foreign markets for exports, the location of domestic producing areas in relation to the main ports, and the value of the commodity in international trade[4]. For example, Pursell and Gupta (1996) estimated that under free trade in the 1990s, the price that the farmer would have received for wheat under free trade would have been about 40 percent lower than the price at which he would have had to compete with imports. By contrast, the estimated free trade export price for milled common rice was about 19 percent lower than the corresponding import competing price. In order to deal with the resulting ambiguity of the nominal protection estimates, the NPC of wheat and rice are calculated under two alternative hypotheses:

a) The *importable hypothesis*: when the foreign product is an actual or potential substitute for the domestic crop in domestic markets.

[4] Pursell and Gupta (1996)

b) The *exportable hypothesis*: when the domestic crop is or potentially could be exported to compete in foreign export markets.

As noted above, reference prices are affected by domestic transport and other domestic costs as well as by international transport costs. In India, these domestic costs are sometimes as great as or larger than international costs. For example, Pursell and Gupta estimated that the storage, marketing and transport cost of shipping wheat from Punjab to Bombay is only slightly lower than the cost of shipping wheat from the US gulf to India. Hence the price the Punjab farmer would receive under free trade depends on where his wheat would have to compete with foreign wheat under free trade. For this, some kind of geographical free trade scenario is needed which would indicate these points of competition. In this paper it is assumed that under free trade import substitutes would compete with imports in the principal port cities, so that the reference price in the supplying region would be the landed price of the import in the port city *minus* marketing and transport costs to get the domestic product to the port. Similarly, the reference prices of exportables are the estimated F.O.B. prices at the port, *minus* port charges and *minus* marketing and transport costs from the supplying region to the port. Assuming competitive conditions in the upcountry region shipping to the port city, this would then be the prevailing price in that region under free trade, since if prices for delivery from the same supplying region to any other domestic market were higher, supplies would be diverted to that market and the prices would fall to the level of the reference price. International freight rates are based on data published in the FAO yearbooks for different origins and destinations.

Moving commodities to be exported from port cities or to compete with imports there or elsewhere also involves marketing costs which include interest charges, handling expenses, storage charges, overhead expenses, miscellaneous expenses arising out of transit and storage losses, and wholesale distribution margins. These costs vary considerably by year, by season and by crop. Based on the study by Sharma and a review of a number of studies[5] by Gulati et al (1990), in the case of foodgrains and oilseeds in the 1980s, Pursell and Gupta has taken marketing costs to consist of an interest charge for two months at an 18 percent rate applied to the procurement price, plus Re 1 per quintal

[5] Pursell and Gupta (1996)

to represent other marketing expenses. Diwakar has been used marketing cost and trader's margin as 6 percent of procurement price. Later approach has been adopted in this paper.

(II)

Trade competitiveness of Wheat and Rice:

There are many indicators to evaluate competitiveness of agricultural commodities i.e. Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC), Effective Subsidy Coefficient (ESC) etc. In this paper NPC; which is the simplest indicator of competitiveness has been calculated for wheat and rice under both importable and exportable hypothesis. The Tables-1 below reveals that from the inception of WTO in the case of both, Wheat and Rice the NPC at importable hypothesis is less than one indicating that these two crops are competitive. This indicates that U.P. was an efficient producer of Wheat and Rice and can efficiently compete with the imports of these commodities. But from 1998-99 as the impact of agreement on agriculture started taking place, NPC under importable hypothesis becomes greater than one, reflects that these produces turn into non competitive. One of the main reasons for declining competitiveness is very hefty falls given to price in international market of both Wheat and Rice over the years.

Table-1: Nominal Protection Coefficient of Wheat and Rice

year	NPC of wheat (Importable Hypothesis)	NPC of wheat (Exportable Hypothesis)	NPC of rice (Importable Hypothesis)	NPC of rice (Exportable Hypothesis)
1994-95	0.63	0.66	0.71	0.74
1995-96	0.50	0.53	0.59	0.62
1996-97	0.52	0.54	0.77	0.81
1997-98	0.40	0.41	0.96	1.01
1998-99	0.53	0.56	1.19	1.25
1999-2000	1.06	1.11	1.27	1.34
2000-01	0.89	0.93	1.25	1.31
2001-02	1.19	1.26	1.21	1.27
2002-03	1.42	1.50	1.16	1.23

The scenario for exportable hypothesis is rather similar. Although in case of wheat, it has retained its competitiveness for some years but recently its production has become non-competitive. Whereas, in case of rice competitiveness decline earlier in comparison to wheat. However over the period, for all these two crops in both cases i.e. importable and exportable hypothesis; NPC is attaining closer to one, indicating that the competitiveness is getting eroded. It may however, be remembered that rice is one of the highly subsidised commodity by U.S. Since the subsidies continue to the quite high level, its international prices tend to remain too low.

Main reason for declining competitiveness of these crops is a general sump in world prices of agricultural commodities due to heavy subsidies by the U.S, which has adversely affected export prospect of the developing countries. It is interesting to note that despite these distortions, India was competitive in the production of both wheat and rice; a removal of trade distortions on these commodities would thus be of great advantage to India. The agricultural subsidies of developed countries as well as the barriers to agricultural imports erected by U.S., Europe and Japan prevent countries such as India from fully exploiting their comparative advantage.

This creates a paradox that the richest and the most industrialised countries, which enjoy no comparative advantage in agriculture, dominate the world export market for several agricultural products. Given their relative labour situation and natural endowment, one would expect, on purely economic ground, that they would specialises in the production and export of industrial goods, leaving to the poor agricultural countries the production and export of agricultural goods But the fact is that despite the high cost of labour and machine, they supply agricultural product to the world market at a price that is lower than that quoted by developing countries Exporter. The paradox is quite easy to resolve. These countries have succeeded in "creating" comparative advantage for their agricultural exports by way of subsidies to their very small number of agriculturists. The subsidy is of such an unimaginable scale that it has turned what is costly and non-viable and should not be produced in developed countries into one of their most lucrative export items.

Competitiveness Without PSE:

Under the Agreement on Agriculture, the impact of domestic support measures is captured through the aggregate measurement of support (AMS). Which further divide in product specific support (PSE) and in input subsidies i.e. non product specific support. India maintains a product price support system in the form of minimum support prices announced by the government for different commodities. For India, the total AMS tends to be negative, suggesting taxation rather than protection of agriculture. Gulati and Pursell present detailed estimates of the margins of protection provided to Indian agriculture by the policies that have been applied[6]. These estimates are based on extremely detailed calculations, taking into account transport costs and the net trade situation of producers in key regions within India, as well as impacts at the border. The negative producer support observed in India stands in very sharp contrast to the high levels of support observed in U.S., E.U. and OECD countries, where Producer Support Estimates averages over 30 per cent. These high rates of protection reduce the demand for agricultural products and hence reduce the demand for exports from India and other net agricultural exporters.

The exporters of agricultural products do not receive direct export subsidies in India. However, the U.S., E.U. and developed countries provide export subsidies *vis a vis* direct product specific subsidies for several commodities like wheat, rice, coarse grains, oilseeds, vegetable oils, sugar, dairy products, fruits and vegetables, which are of great significance for food security in developing countries. Five-sixths of all export subsidies in the mid 1990s were granted by the EU and all but 2 per cent of the rest were on account of exports-support measures given by the US, Norway and Switzerland[7]. Export subsidies have far-reaching trade-distorting affects. In developed countries, the Total Support Estimate (TSE), exceeding US $310 billion[8], encourages overproduction and causes world price levels to fall close to, and even undercut, producer costs in developing countries.

---

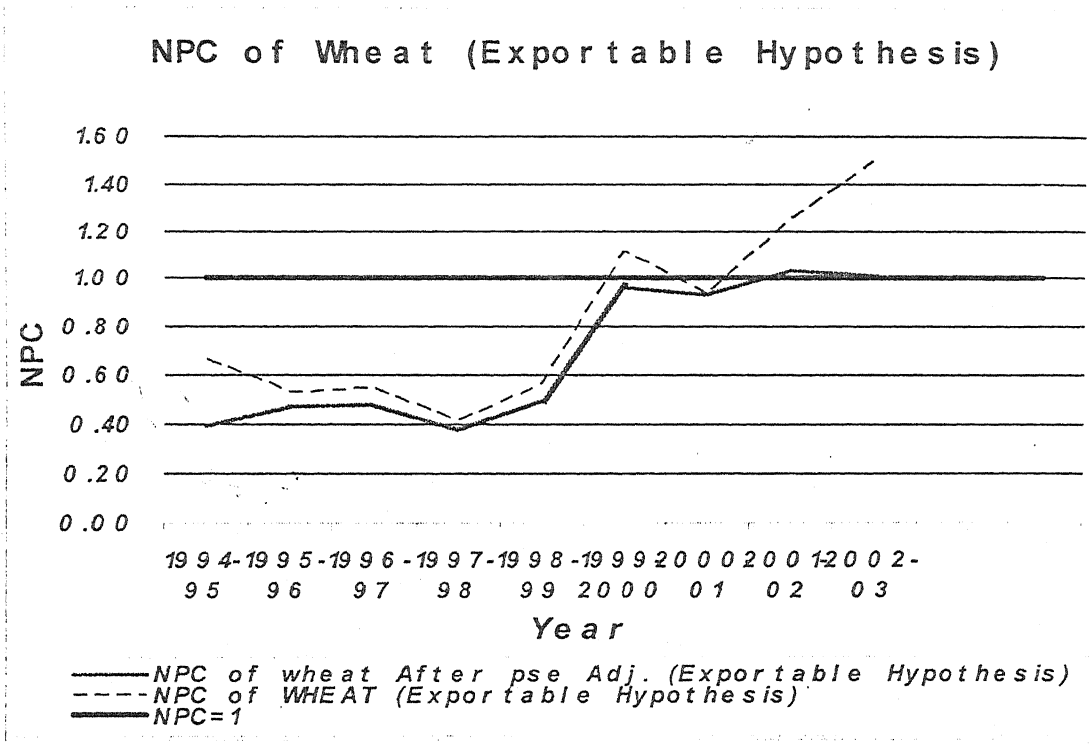
[6] Gulati and Pursell (2003)
[7] Tangermann and Josling (1999).
[8] Messerlin (2006)

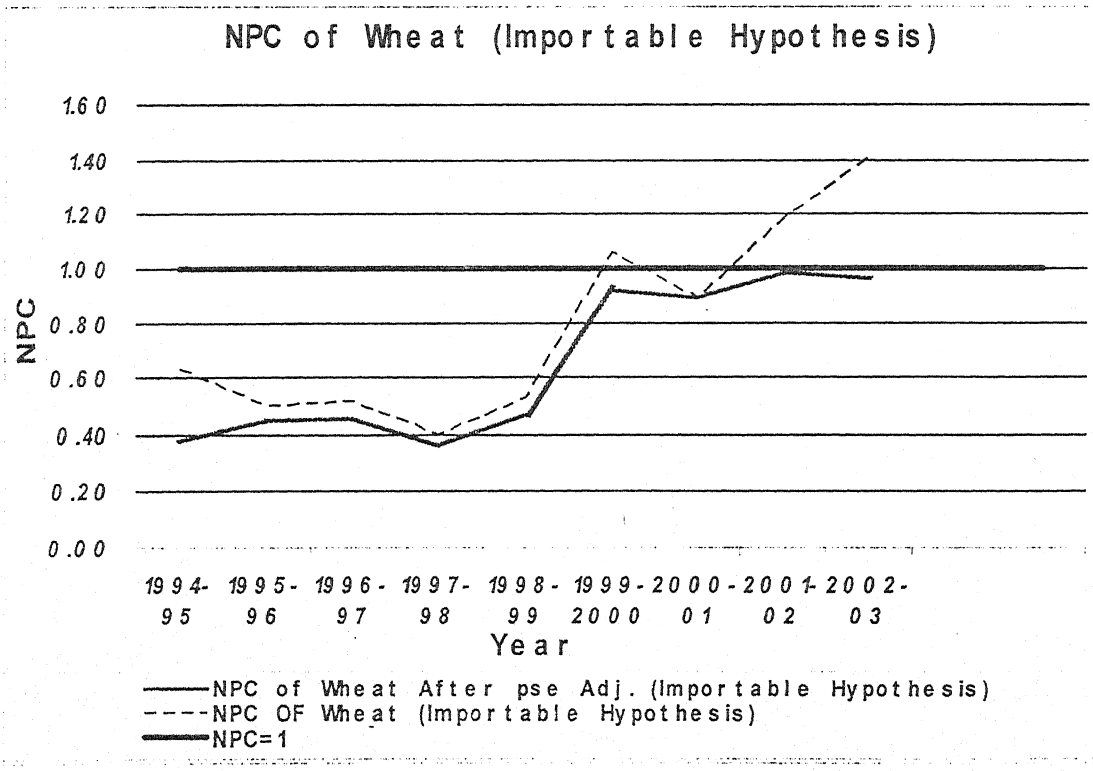
Producer support Estimates (PSE) in India for wheat was negative from 1995-96 to 1997-98 after that it become positive for last few years. For rice it was negative from 1988-89 to 1999-2000. From the year 2000 it become some positive[9]. While in U.S. average Producer Support Estimate for 1998-2000 was 45 percent for wheat and 31 percent for rice[10]. Studies suggest that total AMS in India is much below the WTO commitment while in U.S. and other developed countries their support to agriculture is continued in different form and does not declined despite their commitment, contentions and many round of talks under the auspicious of WTO. However, if we eliminate the Product Specific Support which is a small part of total support for concern commodities i.e. wheat and rice in both countries the competitive situation will be different.

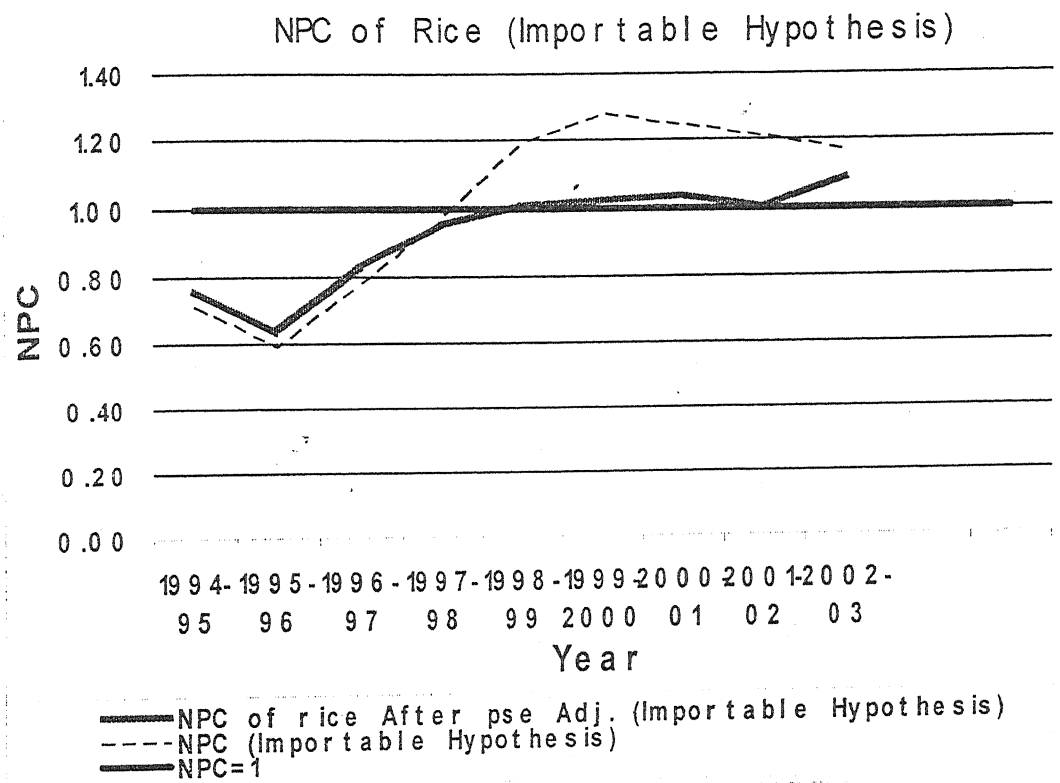
Table-2: NPC of Wheat and Rice after PSE Adjustment

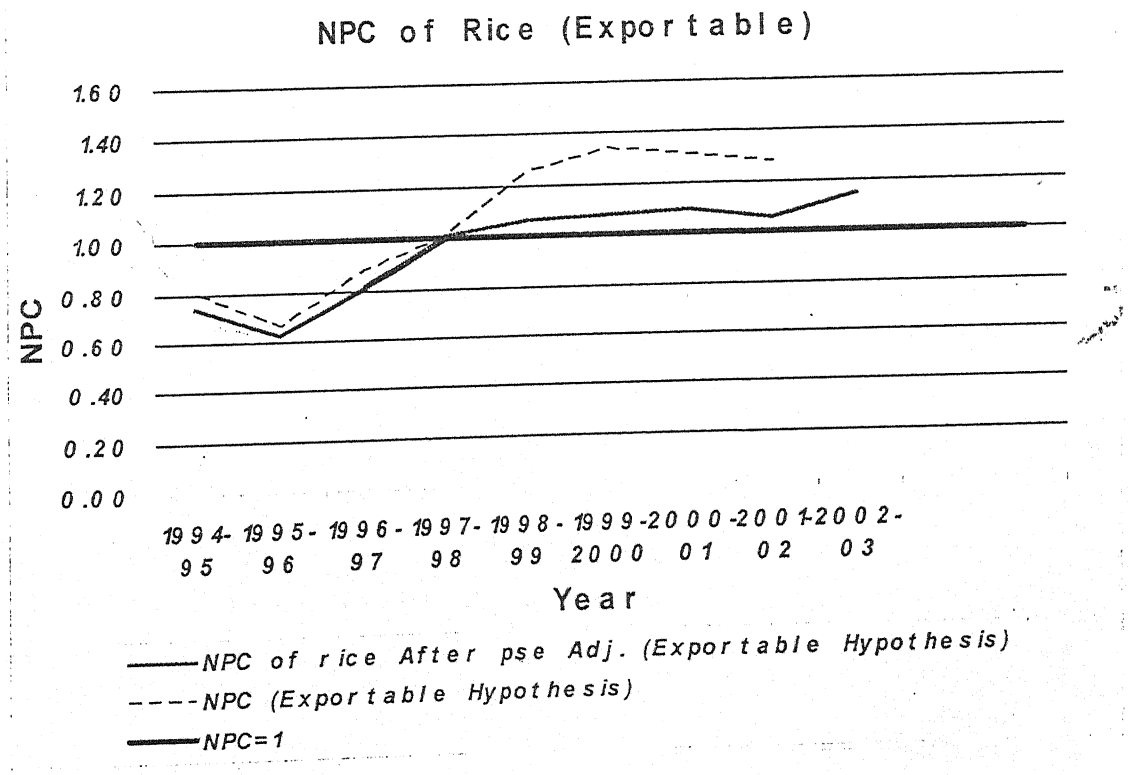
year	NPC of Wheat (Importable Hypothesis)	NPC of wheat (Exportable Hypothesis)	NPC of rice (Importable Hypothesis)	NPC of rice (Exportable Hypothesis)
1994-95	0.38	0.39	0.77	0.80
1995-96	0.45	0.47	0.63	0.66
1996-97	0.46	0.48	0.83	0.87
1997-98	0.36	0.38	0.96	1.01
1998-99	0.47	0.49	1.01	1.07
1999-2000	0.92	0.96	1.03	1.08
2000-01	0.89	0.93	1.04	1.09
2001-02	0.98	1.03	1.01	1.06
2002-03	0.96	1.01	1.09	1.15

[9] Mullen et al (2005).
[10] Roberts And Jotzo (2001).


NPC of Wheat (Exportable Hypothesis)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
NPC
1994-95
1995-96
1996-97
1997-98
1998-99
1999-2000
2000-01
2001-02
2002-03
Year
NPC of wheat After pse Adj. (Exportable Hypothesis)
NPC of WHEAT (Exportable Hypothesis)
NPC=1


NPC of Wheat (Importable Hypothesis)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
NPC
1994-95
1995-96
1996-97
1997-98
1998-99
1999-2000
2000-01
2001-02
2002-03
Year
NPC of Wheat After pse Adj. (Importable Hypothesis)
NPC OF Wheat (Importable Hypothesis)
NPC=1


NPC of Rice (Importable Hypothesis)
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
NPC
1994-95
1995-96
1996-97
1997-98
1998-99
1999-2000
2000-01
2001-02
2002-03
Year
NPC of rice After pse Adj. (Importable Hypothesis)
NPC (Importable Hypothesis)
NPC=1


NPC of Rice (Exportable)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
NPC
1994-95
1995-96
1996-97
1997-98
1998-99
1999-2000
2000-01
2001-02
2002-03
Year
NPC of rice After pse Adj. (Exportable Hypothesis)
NPC (Exportable Hypothesis)
NPC=1

The case of rice is slightly different, it is competitive under alternative calculation for importable hypothesis from 1994-95 to 1997-98, after that NPC becomes more than one. For exportable hypothesis it does not retained its competitiveness after the year 1997-98 by very slim margin. There are two basic reasons for losing its competitiveness; one there is huge difference of PSE in India and U.S.; and two, rice is highly subsidised commodity in U.S.

There are many studies to suggest that Indian agricultural exports are competitive in some extent[11] in the world market. But currently, Indian farm goods do not pass this test because of so many reasons. The alternative calculation of NPC after PSE adjustment suggest that India has a large export potential provided the developed countries remove their trade barriers and withdraw high domestic support to agriculture. India can easily withstand competition from abroad for import of most of the crops even at the current level of tariffs without having a big wedge in term of custom duty. However the import competitiveness is getting reduced overtime because of so many factors. Competitiveness is adversely affected because there is currently a global recession and general down turn in agricultural prices. However huge export subsidy and domestic support being given by the developed countries to their agriculture is a major factor for decline in international prices.

(III)

Ripping Apart From Agreement on Agriculture:

Breakdown of total support into its components: producer support, support granted to agriculture in general, and consumer support suggest that in since 2000-01 the in U.S. PSE has declined from 50.2 percent to 41.7 percent, while General Support Service Estimates (GSSE) and Consumer Support Estimates (CSE) have increased from 25.2 to 31.6 and 17.9 to 26.7 percent respectively in same period[12]. Amount of Total Support Estimates (TSE) also in this period; instead of decline has increased from US $ 93,504 million to US $ 96,972 million. Support granted to agriculture in general gives indication of the real danger of "non trade concerns" being used as substitute for straight

[11] G.S. Bhalla (2004)

[12] OECD2003, 2005

protection in United States and other developed countries[13]. Further decomposition of PSE in U.S. reveals that input subsidies has increased 168 percent in period from 2000-01 to 2003-04[14].

Besides subsidising the agriculture U.S. and other developed countries are using so many erstwhile instruments to protect their agricultural commodities; these includes border barriers, non border price based and quantity based instruments. Agriculture sector in U.S. and E.U. doesn't need virtual support. Motive behind supporting their agriculture sector is to dominate the world trade by artificially make their produce exportable by keeping agricultural prices at low level. Table-3 below reveals that main motive in U.S. to support agriculture are expanding market access abroad and maintain current farm lifestyle. For this purpose all policy directions has been made.

Table-3: Support in U.S. / E.U. Agriculture: Motives and Instruments

	Grain and Oil Seeds					
	Situation			Policy Direction		
	U.S	E.U.	Average	U.S.	E.U.	Average
Motive						
Maintain Current Farm Lifestyle	3	3	3	3	3	3
Provide Preferential Access	1	1	1	1	2	1.5
Link Support to Environment	2	2	2	2	3	2.5
Expand Market Access Abroad	3	2	2.5	3	2	2.5
Instrument - Border Barriers						
Restrict Import Access	1	3	2	1	3	2
Export Subsidies	1	3	2	1	2	1.5
Non Border Price Based Instrument						
High Internal Market Price	1	1	1	1	1	1
Floor Price Support	3	3	3	3	3	3
Domestic Support Subsidies	3	3	3	3	3	3

[13] Evenett and Hockman (2006)
[14] OECD 2002, 2005

Non Border Quantity Based Instrument						
Area Reduction Programme	1	3	2	1	3	2
Production Quota	1	1	1	1	1	1
All	1.6	2.4	2	1.6	2.3	1.9

Note: Strong Emphasis=3; Some Preference=2; Weak Preference=1

Source: ABARE 2000

Floor price support, domestic support subsidies and link support to environment are the main instrument along with export subsidies, restricted import access, production quota reduction, area reduction program and many others[15]. Table-3 also reveals that E.U. too is a major foul player of world trade and it want to capture world agricultural market at any cost. PSE in E.U. has decrease in recent years but subsequently it increases its input subsidies, indirect support to agriculture and consumer support estimates and provided preferential access to expand its market abroad.

It is seen that such subsidised imports from developed countries have suppressed the prices of agricultural goods in India and other developing countries. The cyclical nature of prices of agricultural products, coupled with the exceptionally high amount of subsidies, has posed a threat to farmers in India.

(IV)

Product Specific Support is a small part total support to agriculture. The Totals Support Estimates has two other components i.e. General Service Support and Consumer Support Estimates. Since 2000-01 the evolution of breakdown of the total Support Estimate Suggest that subsidies to agriculture sector in developed countries including United State has shifted inform Other than PSE.

The huge support for agriculture in the U.S., E.U., Japan and other developed countries hurts developing countries in two ways. It makes their farm exports uncompetitive in the global market because it holds down world prices, often below the cost of production. The low prices are clearly not a result of higher production. In fact prices are falling in spite of lower production, countering all supply and demand theories.

[15] ABARE (2000)

Collapsing prices have more to do with concentration of control than with over supply. Farm prices are low because they are being "fixed" by corporate monopolies.

Another destructive impact of the subsidies in these countries is that they facilitate a flooding of developing country markets with these products, in the process destroying domestic agriculture. Lowering their subsidies will aid developing country exports as well as restore agricultural production in countries now hurt by subsidised imports.

Competitiveness of Indian agricultural commodities will increase if we can adjust all the support given to agriculture in both countries. Because AMS is maintained in aggregate rather than in product-specific terms in U.S. and many other developed countries. Consequently, such countries have been able to increase the domestic support for sensitive products such as rice, sugar and dairy products[16]. On the other hand AMS in India tend to be negative in recent past[17].

At the international level, removal of domestic support and export subsidies by developed countries would go a long way in improving India's export prospects. In fact, the Planning Commission's Midterm Review points out that the fundamental reason why there has been a loss of competitiveness in agri-export items from India is on account of the depressed world prices resulting from subsidies. This has been the case in the export of number of agricultural commodities, whose market share has declined in recent years. In addition, reduction of tariff peaks in products of export interest to India would also be important. Other barriers such as TRQs, SPS and other regulations should also be addressed. Better market-access opportunities for niche products such as organic goods need to be explored. At the same time, tariff negotiations should be sensitive to India's livelihood concerns, as a large section of India's poor are dependent on agriculture. The process to move towards achieving such competitiveness must begin today.

[16] Gulati (2001)
[17] Ibid.

References:

1. ABARE (Australian Board of Agriculture and Resource Economics), (2000) "U.S. and E.U. Agricultural Support: Who Does it Benefit October Issue, Canberra.

2. Bandhu Y. (2006), "False Promises and Fetid Practices: How Unfair the game OF WTO's Level Playing Field" Paper presented at Fourth International Seminar on Globalisation and Sectoral development. New Delhi.

3. Bhalla, G.S. (2004), "Globalisation and Agriculture" Academic Foundation, New Delhi.

4. Byerlee, D. and M. L. Morris (1993). Calculating Levels of Protection: Is It Always Appropriate to Use World Reference Prices Based on Current Trading Status? World Development 21:5: 805-815.

5. Cahill, C. and W. Legg (1990). Estimation of Agricultural Assistance Using Producer and Consumer Subsidy Equivalents: Theory and Practice. OECD Economic Studies, Number 13, pp. 13-42.

6. Diwakar D.M. (1993), Incentive to India's Wheat and Rice Growers" The Bihar Journal of Agricultural Marketing, Vol.II, No. 2 1993. Patna.

7. Food and Agriculture Organization (2004). FAOSTAT, FAO Statistical Database, (Online). Available at http://faostat.fao.org/default.jsp [1 June 2004].

8. Government of India (2003). Agricultural Statistics at a Glance, Ministry of Agriculture, Department of Agriculture and Cooperation, New Delhi. (Online). Available at http://agricoop.nic.in/statatglance2003.htm [04 November 2004].

9. Gulati Ashok (2001), "Agriculture and the New Trade Agenda in the WTO 2000 Negotiations: Interests and Options for India" Paper prepared for: The World Bank's Integrated Program of Research and Capacity Building to Enhance Participation of Developing Countries in the WTO 2000 Negotiations. New Delhi.

10. Gulati, A., J. Hanson and G. Pursell. 1990. Effective Incentives in India's Agriculture Cotton Groundnuts, Wheat and Rice. World Bank, Policy, Planning and Research Working Paper No. WPS 332, January.

11. Mullen, K., D. Sun, D. Orden, and A. Gulati. 2004. Producer Support Estimates (PSEs) for Agriculture in Developing Countries: Measurement Issues and Illustrations from India and China. Markets, Trade and Institutions, Discussion Paper no. 74, International Food Policy Research Institute, Washington DC.

12. OECD (2002). "Agricultural policies in OECD countries: monitoring and evaluation 2002." Paris, France.

13. OECD (2004a): 'Agricultural Support: How is it Measured and What does it Mean? OECD Policy Brief, July 2004, http://www.oecd.org/dataoecd/63/8/32035391.pdf

14. OECD . Online Data Archive at http://www.oecd.org OECD Paris, France

15. Organization for Economic Cooperation and Development. "Producer and Consumer Support Estimates OECD Database, 1986-2003," 2004. Available at: http://www.oecd.org/document/

16. *P. Parthapratim* (2005) current WTO Negotiations on Domestic Subsidies in agriculture: implications for India Working Paper no. 177 Indian Council for Research on International Economic Relations New Delhi.

17. Portugal, L. 2002. Methodology for the Measurement of Support and use in Policy Evaluation. OECD, Paris.

18. Pursell G., and A. Gupta. 1996. Trade Policies and Incentives in Indian Agriculture: Background Statistics and Protection and Incentive Indicators, 1965-95. Background Paper no. 1, Sugar and Sugarcane. World Bank, International Economics Department, Washington, DC.

19. R. Ivan and J. Frank (2002) "US Farm Bill: Support and Agricultural Trade" ABARE Research Report 01.13 Commonwealth of Australia 2001.

20. WTO. 2002. Trade Policy Review: India, Report by the Secretariat. WT/TPR/S/100, World Trade Organization, Geneva, March 2.

GROWTH PERFORMANCE OF SUGARCANE CROP AND PROBLEMS OF ITS MARKETING IN UTTAR PRADESH

By

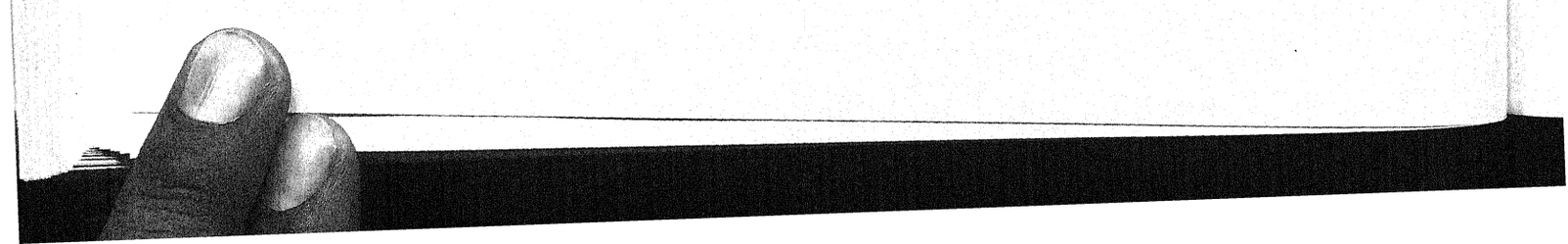
R.C. TYAGI

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



GROWTH PERFORMANCE OF SUGARCANE CROP AND PROBLEMS OF ITS MARKETING IN U.P.

DR. R.C. TYAGI

INTRODUCTION :

Sugarcane is one of the major cash crops of Uttar Pradesh, which plays an eminent role in the state agriculture economy. U.P. is having around 50 per cent of area of the total area under sugarcane crop in the country and on an average more than 42 per cent of the total sugarcane produced in the country. In India the production of sugarcane, its area and yield under this crop increased remarkably in a fluctuating manner since 1980-81 to 1999-2000. During the period 1999-2000 to 2002-03, the area under the cane crop increased from 4220 thousand hectares to 4608 thousand hectares but their production of the crop decreased from 2993 lakh tonnes to 2896 lakh tonnes during the same period. As a result, yield also come down from 70.9 tonnes per hectare to 62.9 tonnes per hectare.

However, Uttar Pradesh is the major producer of sugarcane in the country, even then, it has been found that the yield of the sugarcane crop is much lower in the state, as compare to National level. Yield of the state never attain the National level since 1980-81. The highest yield of sugarcane in U.P. is recorded 61.1 tonnes per hectare in the year 1997-98. Since then, the yield of this crop is reducing almost every year and reached upto a level of 56.3 tonnes per hectare in the year 2002-03.

Another aspect, which is closely related to the area, production and productivity of sugarcane crop is its marketing. The most important thing for this crop is its perishable nature. The perishable nature of sugarcane crop also limits the option for the cultivators. They have to sell their sugarcane within a very short period after its maturity. Otherwise it will go dry and they would be put into a great loss. The farmers cannot store it. Sugarcane has to be cut from fields and it has to be transported immediately to some nearby sugar processing centers and thereafter it must be crushed and juice converted into sugar without

loss of time, because its content sucrose drys up very quickly. All this, reduced the bargain basement capacity of cane cultivator. S0, that is why, this crop has been put under the protection crop by the Government. Farmers depend upon the Statutory Minimum Price (SMP) declared by the Central Government and further State Advice Price (SAP), declared by the State Government, which is usually higher side than the Statutory Minimum Price.

OBJECTIVES

The main objectives of this paper are as follows (1) To examine the trends in area, production and productivity of sugarcane in U.P. during 1980-81 to 2002-03 and compare the same with National level.

(2) To examine and analyze the present pattern of sugarcane marketing and factors effecting sugarcane price.

METHODOLOGY

This paper intends to study and examines the issues framed in the objective with the reference of growth performance of sugarcane crop, its problems of marketing and factors effecting sugarcane price. Paper is mainly based on secondary data and informations. Different published sources have been utilized. The corresponding data in respect of different aspects of India and Uttar Pradesh are collected from different published sources of Indian Sugar Year Book, ISMA, New Delhi. Other data related to the U.P. has been collected from Cane Commissioner's Office Lucknow and Agriculture Directorate, Lucknow.

GROWTH PERFORMANCE OF SUGARCANE CROP

The area, production and productivity of sugarcane crop of India and U.P. during 1980-81 to 2002-03 are given in Table-1. It has been observed that the area, production and productivity of sugarcane increased in the country from a level of 26.67 lakh hectare: to 46.08 lakh hectares, 1,542.47 lakh tonnes to 2,896.30 lakh tonnes and 57.8 tonnes per hectare to 62.9 tonnes per hectare during the period respectively. On the other hand, in U.P. the area, production and productivity of cane crop has increased from 13.63 lakh hectares to 21.67 lakh hectares, 642.05 lakh tonnes to 1,220.62 lakh hectares tonnes and 47.1 tonnes per hectare to 56.3 tonnes per hectare respectively during the same

period. But if we look carefully into the productivity of recent past, during 1997-98 to 2002-03, we can observe that productivity or yield in India and U.P. has been reduced remarkably.

Table 1: **Area, Production and Yield of Sugarcane (All India and U.P.)**

Year/ Season	All India			Uttar Pradesh		
	Area ('000 ha)	Production ('000 Tons)	Yield (Tons/Ha)	Area ('000 ha)	Production ('000 Tons)	Yield (Tons/Ha)
1980-81	2667	154247	57.8	1363 (51.11)	64205 (41.62)	47.1
1985-86	2859	170648	59.9	1490 (52.12)	73058 (42.81)	49.0
1990-91	3686	241045	65.4	1856 (50.35)	103562 (42.96)	55.8
1995-96	4147	281099	67.8	1974 (47.60)	119830 (42.63)	60.7
1995-97	4174	277560	66.5	2111 (50.57)	125348 (45.16)	59.4
1997-98	3967	276254	69.6	1963 (49.48)	119974 (43.43)	61.1
1998-99	4055	288722	71.2	1974 (48.68)	116483 (40.34)	59.0
1999-2000	4220	299324	70.9	2011 (47.65)	115419 (38.56)	57.4
2000-01	4316	295956	68.6	1938 (44.90)	106068 (35.84)	54.7
2001-02	4412	297208	67.4	2035 (46.12)	117982 (39.70)	58.0
2002-03	4608	289630	62.9	2167 (47.03)	122062 (42.14)	56.3

Source: Indian Sugar Year Book (1980-81 to 2003-04), ISMA, New Delhi.
Note : Figures in brackets indicate percentage in relation to the country.

In case of the country it reduced from 69.6 tonnes per hectare to 62.9 tonnes per hectare, while in U.P. productivity of cane crop reduced from 61.1 tonnes per hectare to 56.3 tonnes per hectare (Table-1).

Productivity has become the major source of growth in Indian agriculture. The task of accelerating growth rates in agriculture is becoming more difficult, given the fact that the total cultivable area in the country is virtually exhausted and it is consequently no longer possible to increase output substantially by increasing area alone. In the given condition any reduction in the productivity or yield is a matter of serious concern. If we examine the compound growth rate of sugarcane yield at two points of time 1980-81 and 1990-91 (pre-reform period) and 1990-91 to 2000-01 (past reform period), it has been found that the compound growth rate of pre-reform period was 1.29 per cent and become negative (-0.21 per cent) in post-reform period. the highest reduction in yield has been observed in Western region followed by Eastern and Central region in post reform period. However, in Bundel khand region, it has been observed that the growth rate of cane yield increased upto 2.0 per cent during post-reform period, while it was negative (-1.41 per cent) during the pre-reform period (Table-2).

Table 2: **Region-wise Compound Growth Rates of Area, Production and Yield of Sugarcane of U.P. During Pre-Reform Period and Post-Reform Period**

Regions	Area		Production		Yield	
	Pre-Reform	Post-Reform	Pre-Reform	Post-Reform	Pre-Reform	Post-Reform
	1980-81 to 1990-91	1990-91 to 2000-01	1980-81 to 1990-91	1990-91 to 2000-01	1980-81 to 1990-91	1990-91 to 2000-01
Eastern	2.19	0.75	4.53	0.39	2.30	—0.36
Western	3.19	0.34	5.17	—0.14	1.92	—0.47
Central	6.77	2.54	9.09	4.20	2.18	1.63
Bundelkhand	5.97	7.84	4.47	10.00	—1.41	2.00
Uttar Pradesh	3.48	0.80	5.47	0.59	1.92	—0.21

Source: Uttar Pradesh Ke Krishi Ankaray, Directorate of Agriculture, Lucknow.

Further, it has been observed that the yield of sugarcane crop of sub-tropical areas of the country like Uttar Pradesh, Bihar, Punjab and Haryana and the yield of tropical areas like Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu is having a big difference. The yield per hectare is much higher in tropical areas, than in sub tropical areas. However, the yield in sub-tropical areas has been rising in a fluctuating manner while that in tropical areas it has been stagnant. The details regarding yield per hectare for the year 1985-86 to 1999-2000, broken up into tropical and sub-tropical areas are given in table-3. The all India figures of yield are also given in the table. It will be seen that during the above period of 16 years, the yield per hectare in sub-tropical areas has increased from 48.7 to 56.5 tonnes per hectare, while in tropical areas, its has been stagnated and fluctuated between 86 and 90 tonnes per hectare. Since U.P. is the part of sub-tropical areas of the country, where the climatic conditions are not as suitable as in the tropical part of the country for the sugarcane crop. This is one of the reasons for the low yielding of the crop in U.P. as compare to India.

The area, production and productivity of sugarcane crop of some major cane growing states of sub-tropical and tropical regions of the country have been given in appendix table 1 to 8. Appendix table-9 gives the information of the cane crop of the country.

Table 3: **Yield of Sub-Tropical, Tropical Areas and All India**

(Tons per Hectare)

Year	Sub-Tropical Area	Tropical Area	All India
	Yield	Yield	Yield
1985-86	48.7	86.5	59.9
1986-87	50.4	86.7	60.4
1987-88	50.1	86.3	60.0
1988-89	50.4	84.8	61.0
1989-90	55.5	86.5	65.6
1990-91	55.5	84.9	65.4
1991-92	57.2	84.0	65.8
1992-93	54.5	84.3	63.8
1993-94	57.8	86.9	67.1
1994-95	59.2	90.5	71.3
1995-96	59.9	83.3	68.4
1996-97	58.1	82.1	66.5
1997-98	62.2	86.5	71.1
1998-99	57.8	91.5	71.2
1999-2000	56.5	91.2	70.9

Source: Indian Sugar Year Book (1980-81 to 2003-04), ISMA, New Delhi.

PATTERN OF SUGARCANE MARKETING IN U.P

Sugarcane is the main raw material for sugar industry, khandsari units and gur manufacturers. In recent years most of the sugarcane produced in the State, around 60 per cent goes to sugar mills, 28 per cent goes to khandsari units and gur manufacturing units and 12 per cent goes to seeding, chewing and other uses. A noticeable feature of the sugar industry is that majority of the factories obtain a considerable quantity of sugarcane from long distances only a few factories manage to get all the sugarcane they require from their gate area, that is an area roughly within a radius of 15 kilometers or so. In Uttar Pradesh the entire supplies of cane to factories area met by the Cane Growers Societies or Unions. The latest enactment in force in Uttar Pradesh is-*U.P.Sugarcane Regulation of Supply and Purchase Act. 1953.* This Act, provided not only for the regulation of the supply, purchase and price of sugarcane but also for licensing of sugar factories and fixation of sugar prices.

FACTORS AFFECTING SUGARCANE PRICE

There are a large number of factors that have some bearing on sugarcane price in general. The most important and relevant factors that influences the

price of sugarcane are : (i) Seasonal Factors, (ii) Price of Gur and Khandsari (iii) Price of Alternative Agricultural Produce; and (iv) Fixation of Price by the Government. These points need elaboration to clarify the method of fixation of cane price.

1. **Seasonal Factors:**

It is the mercy of monsoon that a decisive in agricultural life of the country. There is good crop of sugarcane provided seasonal conditions such as timely and sufficient rainfall, required amount of moisture and absence of pests and diseases, prove conductive to the cane crop. Other things remaining as they are, the increased supply of cane due to higher yield leads to lower cane price as payable by the sugar factories. As against this situation, the sugar factories will be compelled to offer higher prices to growers in case of lower cane production as a result of seasonal or weather conditions. Thus, it is clear that fluctuations in cane price are due to seasonal factors also.

2. **Price of Gur and Khandsari :**

The problem of equitable distribution of available sugarcane to the sugar industry, gur and khandsari units is of great significance, not only for stabilizing the sugar industry but also for maintaining suitable prices for both these sectors to avert the cut throat competition. In recent years most of the sugarcane produced in the state and country, around 60 per cent goes to the sugar mills around 28 per cent goes to khandsari and Gur manufacturing units and 12 per cent goes to seeding, chewing and other uses. Just to regulate sugarcane price and avoid cut throat compilation, the radius of 15 kms. of factories may be banned so that the marketing of the entire sugarcane production in the area should be made to the factories.

3. **Price of Alternative Agricultural Produce :**

It is well known fact that sugarcane occupies land for a longer period than any other agricultural crops. It completes growth period extending from 10 months to 18 months. In U.P. the complete growth period of sugarcane takes a period of full one year in the normal course. During this period two or more other

crops including both food crops and cash crops can be grown, which can give the farmers a quicker return for their input invested in place of sugarcane. Paddy, maize, wheat, oilseeds, chilly and different types of pulse crops are the alternatives for sugarcane produce. Sugarcane also needs large investment in the inputs when compared to wheat and paddy crops in which technological break through has already been achieved. The price of these products affect the price of cane payable by the sugar mills. High price of cereals and other money crops give the force to the diversion of sugarcane area to these produce. The situation obtaining in this way compel the sugar mills to pay higher prices for the created scarcity of sugarcane supply. The adverse situation leads to the diversion of food crops and other cash crop acreage to growing of cane crop. Consequently, the factories may enjoy the advantageous position in getting cane at the Statutory Minimum Price (SMP) fixed by the Central Government. Thus the price of alternative agricultural produce has a bearing on the cane supply position and cane price.

4. Fixation of Cane Price by the Government :

The Agricultural Price Commission (ACP) was set up in 1965 to advice the Government on the price policy for agricultural commodities including sugarcane. Central Government fixes the sugarcane price for a sugar season on the recommendation of Commission for Agricultural Cost and Price (CACP). With the announcement of Statutory Minimum Price (SMP), State Government of U.P. simultaneously announced higher State Advice Price (SAP), despite being urged repeatedly to refrain from announcing such cane price as only the Central Government has the authority to fix the sugarcane price under the Sugar Cane Order 1966.

Table-4 illustrates that there is a big difference between the sugarcane price fixed by the Central Government and price fixed by the State Government. The Central Government announced the Statutory Minimum Price (SMP) on an average Rs. 71.74 per qtl. for the year 2001-2002, while for the same year U.P. State Government announced Rs.1000 per qtl. for early variety and Rs.95 per qtl. for late variety of cane, which is quite higher side.

Table-4: **Statutory Minimum Price (SMP) and State Advice Price (SAP) (1997-98 to 2001-02)**

Name of Government	1997-98	1998-99	1999-2000	2000-01	2001-02
Central Government					
Statutory Minimum Price (SMP)					
Eastern U.P.	53.12	59.68	59.56	66.26	70.97
Central U.P.	54.50	59.58	59.86	64.32	69.51
Western U.P.	56.33	62.13	62.33	68.20	74.73
U.P. Government					
State Advice Price (SAP)	75/81	80/85	85/90	90/95	95/100

Source: Indian Sugar Year Book (2003-04), ISMA, New Delhi.

The high side of this State Advice Price (SAP) is obviously of one big reason i.e. political, which should be avoided to control clash between cane growers and mills association and also to control accumulating cane arrears.

CONCLUSION AND SUGGESTIONS

The productivity of cane crop in U.P. makes it evident that the performance of cane crop in the state is not satisfactory as compare to national level. However, the productivity (yield) is coming down in the recent past both at nation al level and in U.P., which is a serious concern. Since most of the cultivable land is under the agricultural use and is at its optimum, it is necessary that desired demand should be met by improving productivity. It can be achieved through the use of modern indigenous technology and improved quality of seeds by the farmers and spreading this new improved technology throughout the country by a suitable extension media.

The problem of sugarcane marketing and its inadequate pricing policy adversely affect on the acreage proportion causing low production and followed by low productivity, resulting in a great national loss. Therefore, it is felt necessary to fix price sugarcane by Central government on a long term basis, say at least for a period of three years with provision of suitable escalation to provide for the changing pattern of realization. These prices should be fixed by the Central Government as per Sugar Control order. 1966, in which only the Central Government had the authority to fix the sugarcane price, to avoid the clash between mills association and co-operative growers association. In this way, it would be possible to ensure and stabilize a steady cane marketing and cane acreage in the state as well as in the country.

Appendix Table-1 : Situation of Sugarcane Crop in U.P. (Sub Tropical Region)

Sen.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tones)	Average Cane Yield (Tones/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	1,363	64,205	47.1	20.14
2.	1985-86	1,490	73,058	49.0	23.56
3.	1990-91	1,856	1,03,562	55.8	31.63
4.	1995-96	1,974	1,19,830	60.7	41.93
5.	2000-01	1,938	1,06,068	54.7	42.55
6.	2001-02	2,035	1,17,982	58.0	65.43
7.	2002-03	2,167	1,22,062	56.3	62.81

Appendix Table -2 : **Situation of Sugar Cane Crop in Bihar (Sub Tropical Region)**

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	111	3480	31.4	60.78
2.	1985-86	119	3937	33.1	66.88
3.	1990-91	149	7805	52.4	58.63
4.	1995-96	124	5644	45.5	76.84
5.	2000-01	94	3988	42.6	79.26
6.	2001-02	113	5211	45.9	74.80
7.	2002-03	107	4601	43.0	98.61

Appendix Table -3 : **Situation of Sugar Cane Crop in Haryana (Sub Tropical Region)**

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	115	5840	40.5	23.63
2.	1985-86	106	5150	48.6	32.99
3.	1990-91	148	7800	52.7	51.03
4.	1995-96	144	8090	56.2	67.23
5.	2000-01	143	8170	51.1	73.15
6.	2001-02	161	9270	57.6	67.62
7.	2002-03	190	10700	56.3	58.65

Appendix Table -4 : **Situation of Sugar Cane Crop in Punjab**
(Sub Tropical Region)

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	71	3920	55.2	14.95
2.	1985-86	78	5050	64.7	29.74
3.	1990-91	101	6000	59.4	51.72
4.	1995-96	132	8620	55.3	84.69
5.	2000-01	121	7770	64.0	65.80
6.	2001-02	142	9250	65.1	67.90
7.	2002-03	154	9290	60.3	64.96

Appendix Table -5 : **Situation of Sugar Cane Crop in Maharashtra**
(Tropical Region)

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	256	23591	92.2	80.04
2.	1985-86	265	23706	89.5	89.97
3.	1990-91	444	38416	86.5	99.66
4.	1995-96	580	46656	80.4	110.32
5.	2000-01	595	49589	83.3	116.24
6.	2001-02	578	45140	78.1	107.19
7.	2002-03	599	37015	61.8	144.28

Appendix Table -6 : **Situation of Sugar Cane Crop in Andhra Pradesh**
(Tropical Region)

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	132	10054	76.2	28.60
2.	1985-86	132	9575	72.5	44.13
3.	1990-91	182	12667	69.5	57.59
4.	1995-96	214	15216	71.3	59.35
5.	2000-01	217	17690	81.4	55.78
6.	2001-02	218	18082	82.9	57.89
7.	2002-03	234	15387	65.8	77.86

Appendix Table -7 : **Situation of Sugar Cane Crop in Karnataka (Tropical Region)**

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	157	12421	79.1	28.79
2.	1985-86	160	12574	78.6	38.71
3.	1990-91	272	20964	77.0	43.84
4.	1995-96	313	24918	79.6	51.68
5.	2000-01	417	42923	102.9	34.99
6.	2001-02	407	33017	81.1	43.77
7.	2002-03	385	32479	84.4	53.26

Appendix Table -8: **Situation of Sugar Cane Crop in Tamil Nadu (Tropical Region)**

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	185	18716	101.2	27.88
2.	1985-86	208	22360	107.5	40.48
3.	1990-91	236	23736	100.6	57.07
4.	1995-96	314	34576	110.1	57.94
5.	2000-01	317	33388	105.3	56.74
6.	2001-02	323	32817	101.6	59.73
7.	2002-03	286	30474	106.5	55.78

Appendix Table -9 : **Situation of Sugar Cane Crop in India**

S.No.	Year	Area Under Sugarcane (000 Ha.)	Total Sugarcane Produced (000 Tonnes)	Average Cane Yield (Tonnes/Ha.)	Percentage of Cane Crushed (By Sugar Mills)
1.	1980-81	2,667	1,54,248	57.8	33.45
2.	1985-86	2,862	1,71,681	60.0	39.94
3.	1990-91	3,686	2,41,045	65.4	50.75
4.	1995-96	4,147	2,81,099	67.8	62.17
5.	2000-01	4,316	2,95,956	68.6	59.72
6.	2001-02	4,412	2,97,208	67.4	60.67
7.	2002-03	4,608	2,89,630	62.9	67.09

REFERENCES

The Bhargava Commission Report (1974), Vol. I Part II, chapter II pp.640-650.

Pillai, M.P. (1972) 'Realistic Cane Price Policy- The Need of Hour', Indian Sugar, Annual Number, July. Indian Sugar Year Book (1995-96-97). Vol. I pp. 15-16, New Delhi.

Tyagi, R.C. (1995), 'Problems and Prospects of Sugar Industry in India: Alternative Strategies for Development', Mittal Publications, New Delhi.

Tyagi, R.C. (1999), 'Crisis in Sugar Industry; Sugar Policy Needs a Change.' The Bihar Journal of Agricultural Marketing, Vol. VII, No.3, July-September.

Indian Sugar Year Book (1980-81 to 2003-04), Indian Sugar Mills Association, New Delhi.

G.S. Bhalla, & Y.K. Alagh (1979) 'Performance of Indian Agriculture : A District-wise Study.' Sterting Publishing (P) Ltd., New Delhi.

KISAN CREDIT CARD SCHEME IN UTTAR PRADESH : PROBLEMS AND PROSPECTS

By

R. S. TIWARI

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024

KISAN CREDIT CARD SCHEME IN UTTAR PRADESH: PROBLEMS AND PROSPECTS

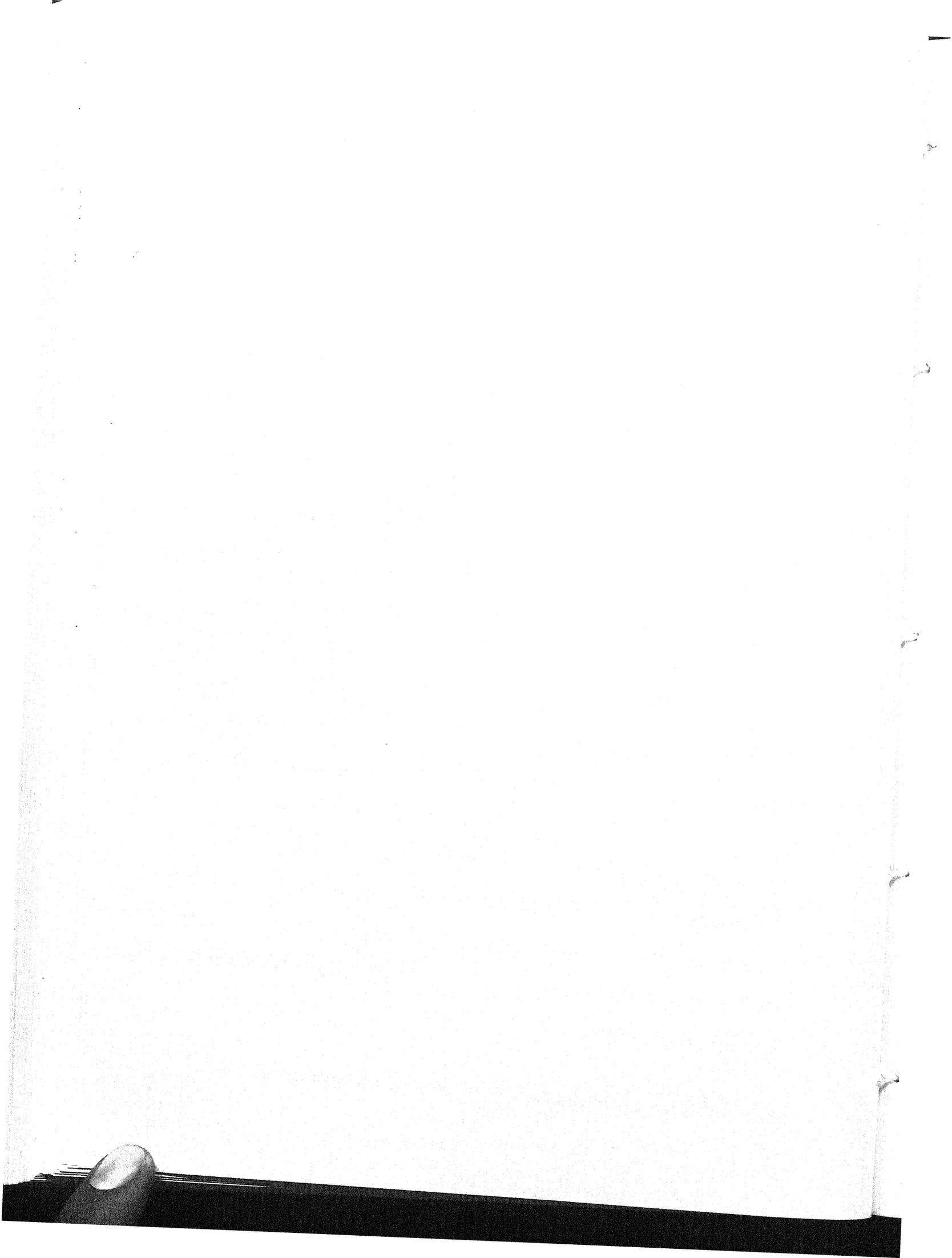
R.S. Tiwari*

I. Introduction

An increasing cost of fertilizers, improved variety of seeds, mechanisation, increased cost of irrigation besides increased wage cost, have resulted into the high demand of credit for the farmers in India and in the State of Uttar Pradesh. So as to overcome such problem, in December 1997, Government of India appointed a one-man high level committee under the supervision of Shri R.V. Gupta, who submitted his report in April 1998. As a follow up, Reserve Bank of India, in 1998, directed all Public Sector Banks (PSBs), Regional Rural Banks (RRBs) and Cooperative Banks (CBs) to introduce Kisan Credit Card Scheme (KCCs) based on the model formulated by National Bank of Agriculture and Rural Development (NABARD) and in due course of time all banks were directed to adopt such scheme.

Present paper in the light of above examines various facets of Kisan Credit card Scheme (KCCs), which is divided into following five sections. Following the introductory Section first, Section second discusses the status of U.P. in national perspective. Section Third describes the main features of Kisan Credit Card Scheme. Section Fourth describes tentatively the main problems faced by farmers under KCCs schemes. Finally, Section Fifth provides the suggestions for the effective functioning of the Kisan Credit Cards in the state of Uttar Pradesh. The present exercise has been carried out considering: (i) banks which provided largest financial help to the state; (ii) banks which provided least assistance to the state; (iii) banks which extended credit to U.P.; and (iv) banks which provided financial assistance to all the states.

*Fellow, Giri Institute of Development Studies, Sector O, Aliganj Extension, Lucknow-226024.



II. The Status of U.P. vis-à-vis the Other States

The above aspects have been examined in respect of: (i) amount of loan per hectare; (ii) amount per borrower; and (iii) percentage of farmers covered during the year 1997-98. Per hectare amount of loan in U.P. comes to Rs.191; loan per borrower comes to Rs.12,035; and that percentage of farmers covered to 1.33 per cent.[1] The corresponding figures in all India comes to Rs.479, Rs.12981 and to 3.72 per cent. The State with largest amount of borrowing per person has been found to be the Jammu and Kashmir, where amount of borrowing comes to Rs.44054, whereas State with lowest borrowing is the West Bengal where it is found to be Rs.6077. Similarly, largest number of farmers has been found in Tamil Nadu (12.9 per cent), while to lowest number of farmers in Assam being to 0.08 per cent. At all India basis, 3.72 per cent of farmers have borrowed. In U.P. merely 1.33 per cent of farmers have borrowed. As far amount of loan per hectare, Kerala stood at the top position with Rs.4936 of loan per hectare, while Assam was at the bottom with Rs.11 per hectare. In U.P., the amount of loan per hectare comes to Rs.191. At all India level, the amount of loan per hectare comes to Rs.479[2] (Table-1).

Table-2 distributes the short-term loan given by the agricultural credit societies across the states. Notably, the amount of loan per borrower is found largest of Rs.116340 in Haryana, while lowest in West Bengal (Rs.8948). In India loan comes to Rs.64460 to per borrower. In U.P. the loan provided to per borrower comes to Rs.9800. As for the percentage of farmers covered, it is found largest in Punjab being to 6.16 per cent, while smallest in Bihar, which is as low as 0.04 per cent. In India, 1.12 per cent of farmers have been covered by the agricultural credit societies. In U.P. 1.4 per cent of farmers took loan from the agricultural credit societies. As far the amount of loan per hectare, Kerala stood the top with per hectare loan of Rs.15808, while Bihar is placed at the bottom with per hectare

---

[1] Mohanty, S. and Haque, T. (2003), "Regional Disparities in the Flow of Institutional Credit in India", *Journal of Rural development*, Vol.22, No.1, pp.79-80 (Table-1), p.82.

[2] *Ibid.*



Table-1: **Distribution of Short-Term Loans issued by Scheduled Commercial Banks in 1997-98**

States	Amount per ha.	Amount per borrower	Percentage of farmers covered
Andhra Pradesh	1319	11139	9.28
Assam	11	9163	0.08
Bihar	64	8539	0.48
Gujarat	836	14058	8.23
Haryana	211	26156	1.13
Himachal Pradesh	151	14000	0.85
Jammu & Kashmir	65	44054	0.15
Karnataka	658	19688	4.65
Kerala	4936	14485	10.20
Maharashtra	197	14891	2.10
Madhya Pradesh	66	26301	0.44
Orissa	161	6897	1.73
Punjab	1047	27416	4.20
Rajasthan	27	14129	0.52
Uttar Pradesh	191	12035	1.33
Tamil Nadu	3763	11904	12.99
West Bengal	309	6077	2.34
All India	479	12981	3.72

Source: Mohanty, S. and Haque, T., *Op.cit.*

Table-2: **Distribution of Loans Advanced by Primary Agricultural Credit Societies in 1995-96**

States	Amount per ha.	Amount per borrower	Percentage of farmers covered
Andhra Pradesh	2120	33810	2.15
Bihar	57	90600	0.04
Gujarat	1026	70120	2.02
Haryana	1924	116340	1.17
Himachal Pradesh	409	37570	0.86
Karnataka	731	82530	1.23
Kerala	15808	49810	9.50
Maharashtra	991	65070	2.42
Madhya Pradesh	159	16292	1.70
Orissa	380	31230	0.90
Punjab	4412	78730	6.16
Rajasthan	222	33540	1.77
Uttar Pradesh	166	9800	1.40
Tamil Nadu	4004	94880	1.73
West Bengal	127	8948	0.66
All India	714	64460	1.12

Source: Mohanty, S. and Haque, T., *Op.cit.*

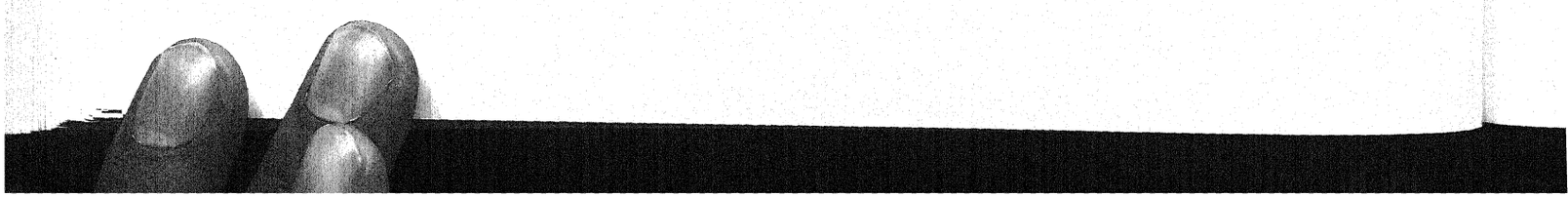
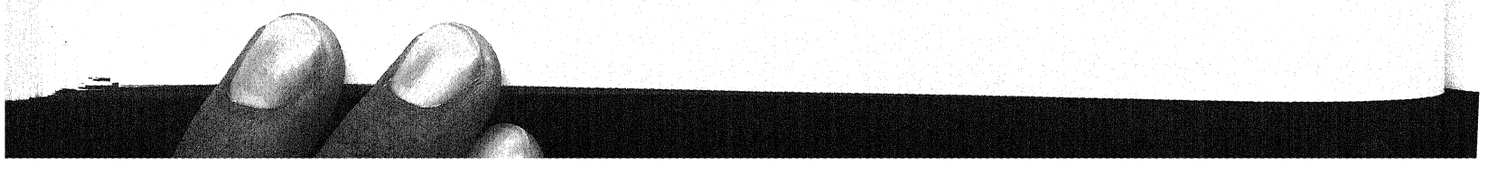


Table-3: **State-wise and Source-wise Distribution of Cash Loans Outstanding in Rural Areas as on 30.06.1991**

(Per Cent)

State	Co-operatives	Commercial Banks	Government including PF, etc.	Landlords	Agricultural Moneylenders	Professional Moneylenders	Traders	Other Sources including relatives and friends
Andhra Pradesh	12.4	15.4	0.4	15.4	18.9	3.1	0.1	7.8
Assam	8.3	34.5	18.4	0.0	0.5	3.5	2.6	27.3
Bihar	20.1	36.9	7.1	1.8	8.4	7.9	1.5	7.8
Gujarat	39.7	29.2	4.5	0.8	0.5	2.8	0.7	20.0
Haryana	23.0	43.5	2.5	7.8	6.3	6.3	3.0	3.3
Himachal Pradesh	21.7	32.9	3.9	0.4	1.6	2.5	0.1	32.2
Jammu & Kashmir	9.1	43.0	5.1	2.0	1.6	0.6	2.2	17.9
Karnataka	22.1	42.7	5.2	3.3	5.4	4.7	0.8	5.9
Kerala	45.6	19.1	22.9	0.0	0.1	2.6	0.6	5.0
Madhya Pradesh	21.2	44.5	3.6	2.1	8.3	13.8	0.8	1.1
Maharashtra	45.4	27.2	6.3	0.8	3.6	3.2	0.4	10.3
Manipur	31.1	0.4	17.9	--	2.3	--	--	39.8
Meghalaya	23.2	--	67.4	--	--	--	--	9.4
Nagaland	73.0	27.0	21.0	--	3.0	0.3	--	40.3
Orissa	21.5	44.2	7.5	0.3	3.0	9.6	0.0	5.2
Punjab	20.1	55.3	2.8	2.0	1.5	2.1	2.6	12.3
Rajasthan	6.6	25.4	4.1	3.1	8.9	28.4	11.0	3.7
Sikkim	12.2	50.7	26.1	--	4.2	--	4.0	1.2
Tamil Nadu	17.5	32.5	5.2	4.2	4.8	17.3	2.0	13.5
Tripura	12.8	49.9	26.7	--	0.5	1.4	2.4	6.3
Uttar Pradesh	14.2	44.8	7.5	1.6	8.6	7.1	1.8	11.7
West Bengal	20.1	41.5	15.8	0.1	2.2	3.7	1.4	10.7
Andaman & Nicobars	10.1	24.7	47.9	--	--	1.8	0.1	13.6
Arunachal Pradesh	1.5	4.3	41.6	--	--	8.7	--	17.8
Chandigarh	64.5	18.1	0.9	--	--	6.2	0.3	10.0
Dadra & Nagar Haveli	5.9	20.0	27.1	--	--	--	--	47.1
Delhi	8.3	21.1	10.2	0.6	17.9	5.8	9.3	16.9
Goa	12.9	44.3	18.4	--	--	0.1	--	22.5
Lakshadweep	30.8	18.6	14.2	--	--	--	--	36.4
Mizoram	--	0.6	97.6	--	--	--	--	1.8
Pondicherry	26.8	49.3	1.8	--	--	22.1	--	--
Daman & Diu	--	48.0	--	--	--	--	--	52.0
All India (Average)	21.6	33.7	6.7	4.0	7.1	10.5	2.5	8.7

Source: Mohanty, S. and Haque, T., *Op.cit.*



loan of Rs.57 only. In India, per hectare loan comes to rs.714. In U.P. the per hectare loan comes to Rs.166. The above empirical analysis suggests the position of U.P. in terms of loan provided by the agricultural credit societies. This is found applicable for all states and India as well.[3] To facilitate the finance, Kisan Credit Card scheme has been introduced through the direction of RBI.

However, Assam and Gujarat received the money from agricultural moneylenders to 0.5 per cent respectively from the agricultural moneylenders. U.P. had taken loan to 8.6 per cent from this particular source. In India 7.1 per cent of credit has flown from agricultural moneylenders. From the commercial banks, Punjab took loan to 55.3 per cent being the largest from this source. The lowest was the Manipur being to 0.4 per cent. In U.P. 44.8 per cent of credit was taken from the commercial banks. At all India level, 33.7 per cent of loan has been taken from the commercial banks. Source of money from P.F. is found to be largest in Meghalaya (67.4 per cent), whereas lowest in Andhra Pradesh (0.4 per cent). In U.P. the corresponding figure comes to 7.5 per cent and that in India to 6.7 per cent. The loan from landlords is found to be the largest in Andhra Pradesh (15.4 per cent), whereas, it does not exist in Assam and Kerala. In U.P. it comes to 1.6 per cent and that in India to 4 per cent respectively (Table-3).

III. Main Features

We may now discuss the main features of Kisan Credit Cards. Kisan Credit Cards, which is an innovative method of cash delivery system. It is mainly determined by the land holding size, rate of interest on the credit, which is proposed to be used invariably by the farmers for the purchase of input, fertilizers, pesticides, improved varieties of seeds and partly to meet the expenses on irrigation. For these purposes, the amount of various banks is stated as hereunder under the Kisan Credit Card scheme.

---

[3] *Ibid.*

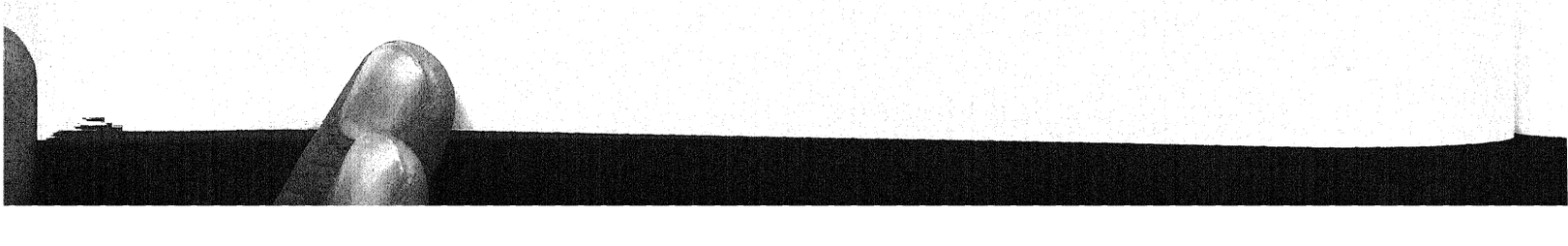


Table-4: **Sources of Finances from Commercial and Non-Commercial Banks**

Sources of Funding	Amount (in Rs. Crores)	Percentage of Total
Commercial Banks	57000	54.23
Regional Rural Banks	8500	8.09
Co-operative Banks	39600	37.68
Total	105100	100.00

Source: *Economic Survey* (2004-05), Government of India, Ministry of Finance, p.179.

In 2004-05, over half of the credit (54.23 per cent) was extended by the Commercial Banks, while to 37.68 per cent by the Cooperative Banks. Also, 8.09 per cent of credit was given by the Regional Rural Banks. Other features of the Kisan Credit Card include: (i) issuing of credit card-cum-pass-book, which contains name, address, landholding size, borrowing limit, validity period, passport size photograph of the holder. It is presumed as an identity card of the credit holders. It also involves revolving cash credit consisting of any number of drawls and deposits within the specified limit.

IV. Problems

The problems under Kisan Credit Cards is no less significant than those observed under various rural development programmes. First, generally farmers are not aware about the existence of Kisan Credit Card scheme. Second, generally, there is under and over reporting of landholding size of the farmers, which prohibits extending credit facility to needy and deserving credit seekers. Third, frequent visit to bank for meeting bank officials for loan generally lead to harassment and thereby farmers are rarely attracted to seek loan from the banks. Fourth, in certain cases, the payment of unaccounted money is also involved, which prohibits loan seekers for taking the advantage of Kisan Credit Cards. Fifth, generally rate of interest is quite high, which loan seeker farmers find it extremely difficult for repayment. Sixth, the procedure of preparing Kisan Credit Card has generally been stated to be cumbersome and somewhat time consuming. Seventh, the landless farmers



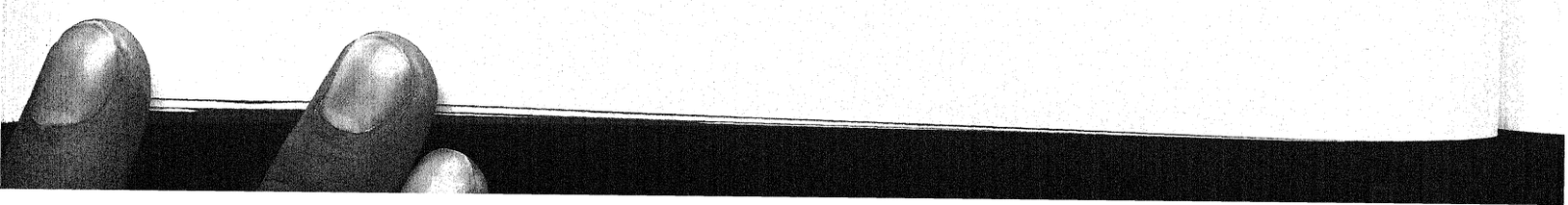
are completely left out from this scheme. These problems are such that prohibits the loan seekers even by Kisan Credit Cards to take the loan.

V. Policy Implications

Kisan Credit Card Scheme being quite recent is less popular among the farmers. It would be advisable that scheme is made popular through TV channels, seminars and conferences. District as well as block level officials are required to make Kisan Credit Card scheme known among the farmers. As such, the repaying capacity of farmers is extremely low for which it would be advisable to bring the rate of interest down below the existing rates of interest prevailing in SBI. May be that rate of interest be made at 5 per cent fixed for the loan undertaken under Kisan Credit Card scheme.

Besides above, village Pradhan or other reliable village official may help in procuring the necessary documents for preparing the Kisan Credit Cards. It would avoid wastage for farmers going from their native place to the banks. Village Pradhan, CDO and Bank Officials may do it easily and comfortably, which would encourage in the long run for preparing the Kisan Credit Cards for the time to come.

It may, however, be noted that various policy measures recommended for the development of farmers through the help of Kisan credit card need to be treated as temporary device for the growth of farmers in the state of Uttar Pradesh. However, if these are treated as permanent 'stretches', it is recommended that these policy measures must immediately be withdrawn. Also, policy incentives must be used for the purpose for which these are extended and that its misuse must be avoided. These are some of policy recommendations derived from the present study, which are consistent with development of farmers through Kisan Credit scheme in the state of Uttar Pradesh.



AGRICULTURAL DEVELOPMENT WITH KNOWLEDGE BREAKTHROUGH IN UTTAR PRADESH

By

NOMITA P. KUMAR

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



AGRICULTURAL DEVELOPMENT WITH KNOWLEDGE BREAKTHROUGH IN UTTAR PRADESH

Nomita P. Kumar*

Introduction

Prior to the recent daunting challenges posed by the knowledge and information revolution national development was determined by factors like capital in the form of technology. These factors continue to be at work but their relative contribution and importance has rapidly been shifting along several dimensions. The predominance of the agricultural sector gets reduced giving way to manufacturing and subsequently to services as they tread the path of development. Similarly, agricultural development today is also influenced by the dawn of knowledge revolution. Knowledge has also replaced capital as the most important determinant of economic development as the Noble laureate economist Robert Solow showed in a study in mid-1950s that $7/8^{th}$ of the growth of US from 1900 to 1950 was accounted for by technical progress, while only $1/8^{th}$ was driven by capital (Solow, 1957). A similar study of factors contributing to the growth of the US economy from 1929 to 1982 by Denison, attributes 94 percent of growth to factors relating to knowledge generation and dissemination, 64 percent of this was linked to advances in knowledge generation and another 30 percent to advances in education (Denison, 1982).

Although debate continues about whether knowledge is here to stay, the economic rationale underpinning it is solid. The ICT revolution has made instantaneous knowledge sharing economical; and as observed by Clark (1923), "Knowledge is the only instrument of production that is not subject to diminishing returns". Knowledge is viewed not only as an input to development projects and programmes, but also as an output (lessons learned) worth sharing. Hence, investment in human capital is critical for economic growth. Particularly important are new technology, its dissemination through education and related

---

* Post Doctoral Fellow at Giri institute of Development Studies, Lucknow.

externalities (Romen, 1989; Lucas, 1988; Barro, 1991; Mankin, Romen and Weil, 1992). Researchers have documented the external effects of human capital in Austria, China and Guatemala (Winter-Ebmer, 1994; Wang and Modi, 1997; Sakellariou, 2001). They have tied growth to knowledge in Israel and found spill over effects of human capital in the Republic of Korea (Bregman and Marom, 1993; Feenstra and Others, 1999).

The transformation of the development trajectory is no more conditioned by Harrod-Domar technical coefficients and the rate of growth of physical capital alone. Human capital is already surging ahead to replace physical capital as the sole mover of the growth process. In the age of knowledge revolution a workers intellectual capabilities are no less important than the quality of machines installed or the quality of raw material processed or any combination of the two (Chadha, 2003).

Nearer home, India's Green Revolution is a strong example of how the input of greater knowledge in the form of improved production technologies can rapidly increase the productivity of scarce land resources (Planning Commission 2002). Recent IT revolution in India is a striking proof of how the importance of human capital has come to acquire a higher position than that of material plant and machinery. In 2001, Sachs, Bajpai and Ramiah (2002) observed that following the Green Revolution, high growth occurred in Punjab and Haryana and, to a lesser extent, in the adjacent states of Rajasthan, Gujarat and Maharashtra.

Modern agricultural technology has vast potential for increase in productivity of agriculture. This makes it a subject of great interest to policy makers. The present paper attempts to study the behavior of farmer households in obtaining information on modern technology for farming. This paper looks at the role and status of the farmers in the newly emerging knowledge economy. The data for this study is primarily collated from the NSS Reports. The plan of the paper is as follows. Section II examines the state of agriculture in the state of Uttar Pradesh. Section III reviews the importance of human capital in the phase of new agriculture. Section IV looks at the education profile of the farmer, while Section V deals with the sources and quality of information available to him. The final section gives suggestions for strengthening the public extension system to cope up with the challenges of the knowledge economy in the agricultural sector.

II. Overview of U.P's Agricultural Sector

Agriculture, as we know is the largest sector of the state's economy with highest share both in state income as well as in employment. However, there is a gross imbalance in these shares as its share in total workers of the state is far higher than its share in state income. As a result, the average income per worker of this sector with largest workforce is far less compared to the corresponding income per worker in other sectors of the economy. Although the share of agriculture in the total income of the State has come down to 33 percent from 42 percent during the last decade, there is hardly any decline in the share of the work force engaged, which is about 72 percent, in this sector. Consequently, the per capita income in agriculture sector is much lower and totally inadequate as compared to other states in the country (CII, 2004)

The consequences of this on development and growth of agriculture and on the over-all economy of the state as a whole are not difficult to ascertain. It is very pertinent, therefore, that the State's policies should reiterate its focus on raising average income per agricultural worker. This cannot take place without a significant jump in agricultural output and productivity growth rates together with a significant shift in occupational distribution of workforce away from agriculture to other sectors of the economy.

It is usually believed that employment structure in an economy depends upon the stage of development. Uttar Pradesh is also undergoing a similar transition in its economic structure. However, the changes in the employment structure are much slower than changes in the composition of GDP. In 1993 the primary sector contributed 42 percent of the GDP. The share declined to 33.3 percent in 1999-00. Table 1 highlights the pattern of employment generation in the pre and the post reform period. During the pre reform period (1981-1991) primary sector contributed 58.63 lakh of additional employment generation, while the share of the tertiary and secondary sectors was 2.84 lakh and 28.32 lakh respectively. In the post reform period (1991-2001) primary sector dominating with 72.47 percent share in additional employment generation followed by tertiary sector which contributed 19.26 percent. In this period the number of secondary sector workers registered 7.74 percent of growth. The rural workforce holds the key to any substantial diversification of employment as a whole, as it constitutes over three-fourths of the total workforce of the state. Although the share of non-agricultural activities in employment has been increasing

over time, rural Uttar Pradesh continues to remain primarily an agrarian economy, with a high proportion of its working population still engaged in agricultural activities.(kumar, 2003)

Table 1: Shares of Different Sectors in Increase of Employment (Lakhs)

Sectors	1981	1991	2001	Increase (1981-91)	Share in Increase 1981-91 (%)	Increase (1991-2001)	Share in Increase 1991-2001(%)
Primary	243.32	301.95	378.53	58.63	65.41	76.58	72.47
	75.11	**73.00**	**72.90**	**-2.10**		**-0.11**	
Secondary	29.22	32.06	40.24	2.84	3.17	8.18	7.74
	9.02	**7.75**	**7.75**	**-1.27**		**0.00**	
Tertiary	51.28	79.6	99.95	28.32	31.59	20.35	19.26
	15.83	**19.25**	**19.25**	**3.42**		**0.00**	
Total	323.97	413.61	519.28	89.64	100.00	105.67	100
	100.00	100.00	100.00				

Source: Tenth Five Year Plan , U.P. 2002-2007. Volume -1 (Part -I).
Note: Figures in bold show percentage to total and change in percent point.

According to the Task Force set up by the Planning Commission such a transition would increase agricultural productivity and release surplus person power from traditional agriculture, which would then be, redeployed elsewhere (Planning commission, 2001). This release of labour from traditional sector for other activities can only be useful only when the economy is able to absorb this labour in productive ways.

Except for a brief spell of ten years, from 1980-81 to 1990-91, when average annual growth in agriculture was 3.2 percent, agricultural growth in a long spell of fifty years, from 1950-51 to 1999-2000, was far too less. It was 1.5 percent in the first twenty years of planning, from 1950-51 to 1970-71, followed by a marginally higher growth of 2 percent in the next ten years from 1970-71 to 1980-81. A jump in this growth, from 2 percent to 3.2 percent in the following decade, from 1980-81 to 1990-91, was a welcome feature and signified a marked improvement in agriculture. However, this could not be sustained in the subsequent years.

Dependence of state's economy on agriculture, on the one hand, and poor performance of agriculture, on the other, are matters of great concern for the development of the state. The factors constraining agricultural growth require a very careful investigation in order to chalk out suitable strategies and policies for a higher and sustained growth in agriculture. The schemes and policies that we have at present for the development of agriculture are not yielding the desired result. We need to have a well thought out and comprehensive approach which can break the current stagnation and boost up growth in agriculture.

The impact of higher growth in agriculture on state's economy will not be felt to the desired extent until it also leads to rise in the income of the workforce engaged in it. Currently, this workforce is much more than what is required for full and gainful employment leading to severe underemployment of labour force in agriculture. The workforce in agriculture in 1981 was 243 lakh, comprising 75 percent of State's total workforce. It rose by 24 percent to 302 lakh in 1991. The share of agricultural workers in state's total workforce declined only marginally, from 75 percent in 1981 to 73 percent in 1991 and a little further to 72 percent in 2001 . But while these shares have gone down only marginally, the fall in shares of agriculture in total State income has been far too steep. The share of the sector in state income fell from 50 percent in 1981 to 41 percent in 1991 and further to 33.3 percent in 2001. The decline in agriculture's share in state income comes to 17 percentage points against a far smaller decline of 3 percentage points only in its share in state's total workforce. This is an evidence of a trend of growing imbalance in the distribution of state income against agricultural workers, which comprises about three-fourth of the total work-force of the state and whose income levels are, therefore, very material in creating the demand for goods and services, the most effective stimulant to growth in the economy. It is this workforce that we must target more effectively in our development policies, strategies and programmes so that the large surplus among them shifts in due course to more remunerative occupations outside, leaving behind a workforce which the sector requires for full and gainful employment.

There are various reasons for the above mentioned disquietening trends in agriculture sector. Low productivity of main crops, lack of diversification in agriculture from low value to high value crops, inadequate and inefficient infrastructure for

development in rural areas and slow employment generation in other more remunerative sectors of the economy and above all the lack of knowledge to exploit the benefits from agriculture are some of the main reasons for these trends. Unless the development process in the state addresses itself to these basic reasons in a satisfactory manner, growth in agriculture and for that matter, in the economy as a whole, will not pick up to neither the desirable level nor the burden of population on agriculture for its livelihood will reduce.

There are several factors which account for low productivity and lack of diversification in agriculture. These include, among others, consistent increase in the number and area of uneconomic and non-viable operational holdings, inadequate and inefficient irrigation network, inadequate development of rural infrastructure, more particularly of roads and lack of proper and adequate marketing and storage facilities with little contribution from agro-processing units.

According to Tenth Five Year Plan of Uttar Pradesh 75.4 percent of total holdings in the States were less than 1 hectare in 1995-96 and accounted for 33.75 percent of the total area of holdings. The average size of holdings in this category was only 0.39 hectare. The average size of all holdings came down from 0.90 hectare in 1990-91 to 0.86 hectare in 1995-96. The increase in the number and area of 'uneconomic and non-viable' agriculture holdings together with decline in average size of holdings is acting as a major constraint on capital formation and growth in agriculture. It is high time that we take note of these changes and make some assessment of the impact these are having on agriculture development in the State and to take such steps as may be necessary on the basis of this assessment. This is undoubtedly a very complex question having several ramifications but any further postponement of consideration of this matter is not desirable.

III. Changing Paradigm of Human Capital in Agriculture

Agriculture in the coming days is likely to become a more high-tech activity with increasing role of bio-tech and genetic complexities (Chadha 2003). Various soil related and environmental issues have a direct bearing on sustainability of agriculture and occupational safety of the agriculturist. A farmer can be knowledge worker if he understands the soil in which he sows, the pros and cons of the use of pesticides and if he is able to translate weather forecasting to his favour while planting seeds, etc. The educated

farmer will be able to distinguish between various ways and means for the betterment of their crops and their progeny will have less difficult time ahead.

Agricultural diversification requires high degree of awareness about technology, market intelligence, price competitiveness, etc. Education atleast till secondary level of school is a must to ensure proper access on all these fronts. New form of agriculture as floriculture, horticulture, dairying and poultry all require educated and skilled form of human capital. Studies have highlighted the fact that agro-processing firms especially the multinationals are rather choosy in the selection of farmers to involve them in their activities and high school degree is insisted in many cases (Singh, 2000: 287 as cited in Chadha, 2003).

New agriculture also requires IT based production especially those catering to the export market because of rigorous farm production and time management schedules. Further, efficient agriculture requires proper water management and use of non-conventional renewable sources of energy (Chadha, 2003). In the new agriculture conventional techniques of operation would prove to be obsolete and inefficient. Hence education and training would be the prime requirement for learning and adopting the modern farming techniques in new agriculture era.

To meet the future challenges requires transforming the traditional economy into a well-developed "Knowledge Society" capable of producing goods and services rich in explicit and implicit knowledge. Our farmers need to be "empowered" to exploit the latest available information and knowledge about cultivation practices, inputs and output markets and becoming "knowledge workers".

Today Indian economy carries an ambitious aspiration to empower the farming community by having access to the latest knowledge and techniques and using them for improving their conditions. A vibrant and dynamic knowledge society has to touch every member of the society, including farmers and housewives. Therefore every strata of society should become consumer of knowledge products that will make them an integral part of a prosperous society. It is realized that we should not miss on this front of information and knowledge revolution and properly synergies our competencies with innovative planning, use all our natural endowments and leverage these by the use of knowledge.

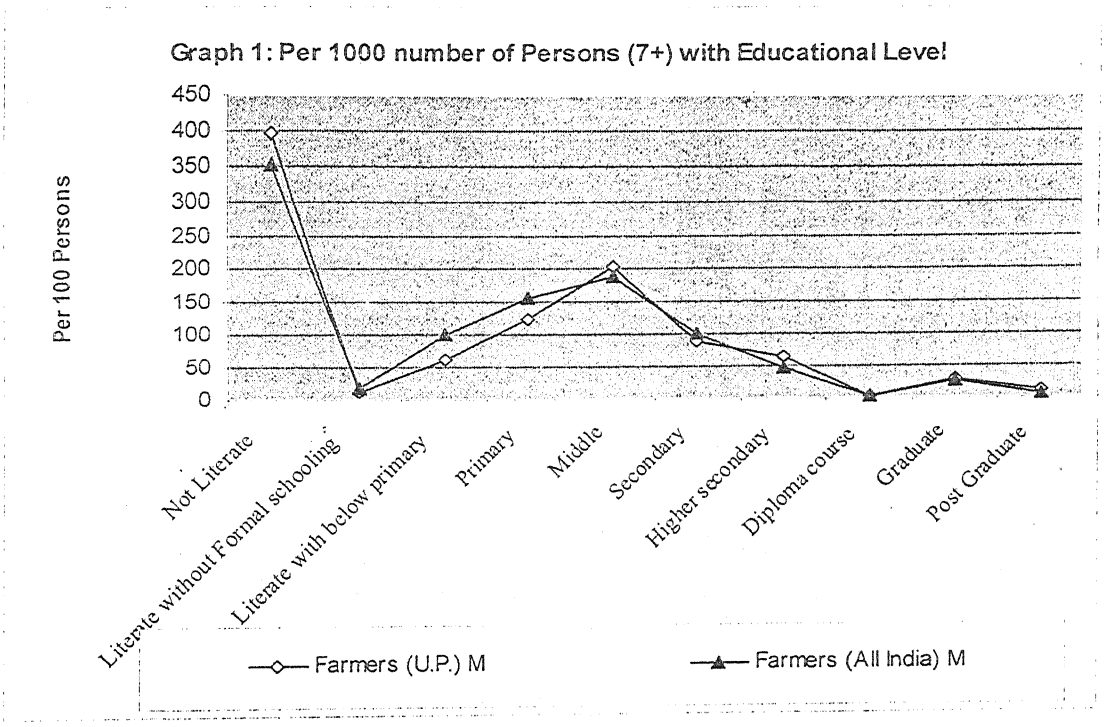
IV. Educational Profile of Indian Farmers

In the light of the above discussion it would be quite pertinent to find out the status of education of the farmer community. The break-up of persons aged 7 or more or who were engaged in farming as farmer (whether male or female) in 2003 by ten different levels of education is shown in Table 2. For comparison the breakup for the farmers at all India level is also shown alongside. Table 2 highlights the poor quality of human resources in terms of the education level amongst the farmer in Uttar Pradesh and All India situation are shown. As many as 396 male farmers and 811 female farmers per thousand persons are illiterate. Only 8.8 percent of male farmers have received education up to secondary level and above. It is interesting to note that the status of 'Farmer or Farmer Households' whether in Uttar Pradesh or a 'Farmer or Framer Households' of India is almost the same. The fact is that large numbers belong to 'Not Literate' category - which reflects on the pathetic condition of our farming community, which in turn are denied many recent knowledge in their field which would have helped them reap the benefits that accrue due to awareness that follows being a 'Literate Farmer '.

Table 2: Per 1000 Number of Persons Aged 7+ with level of General Education

Educational Profile	Farmers (U.P.)		Farmers (All India)	
	M	F	M	F
Not Literate	396	811	351	692
Literate without Formal schooling	11	4	17	9
Literate with below primary	63	28	101	64
Primary	125	66	157	102
Middle	204	57	188	85
Secondary	88	20	100	32
Higher secondary	66	12	48	11
Diploma course	2	0	4	1
Graduate	31	3	26	3
Post Graduate	13	0	7	0

Source: *NSS Report No. 496: Some Aspects of Farming, 2003.*.



It can be observed that the break-up of persons by educational level of all members of farmer households matches that of the educational level of farmers of All India very closely, for males. The rate of illiteracy among the farmers appears to be high. Still it may be observed that the proportions of farmers in Uttar Pradesh, particularly the males at different levels of education were close to those for the farmers of All India.

Table 3: Literacy Level of Farmer and Their Awareness on Varied Fields

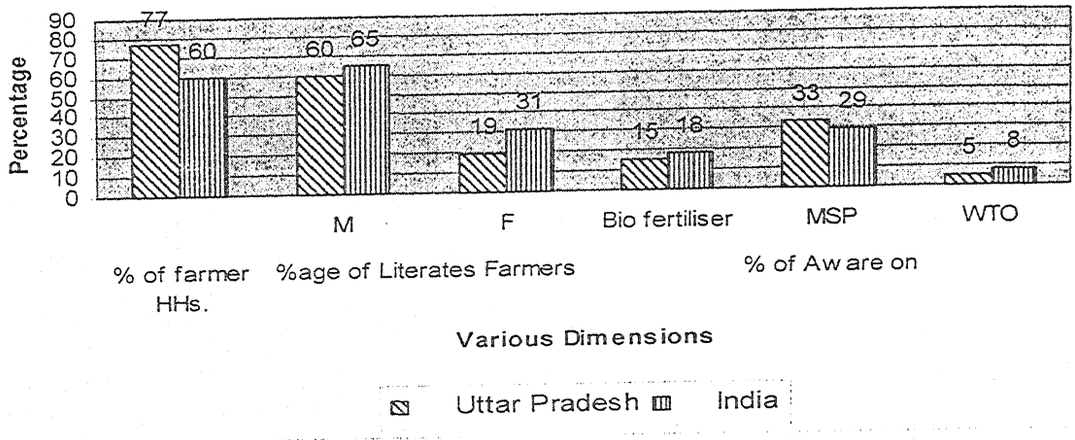
States	% of farmer HHs.	%age of Literates Farmers		% of farmers Aware about		
		M	F	Bio fertiliser	MSP	WTO
Uttar Pradesh	77	60	19	15	33	5
India	**60**	**65**	**31**	**18**	**29**	**8**

Source: NSS Report No. 496: Some Aspects of Farming, 2003.

Table 3 shows the literacy levels and awareness about technical and institutional development in the State of Uttar Pradesh. Literacy may be taken as a proxy for knowledge. We find that States where literacy is high awareness is also high whether in the field of bio-fertiliser, market supply price or WTO. Farmers were asked whether they were

aware of bio-fertiliser and estimated 15 percent of farmer households sais that they were. Awareness on market supply prices is found to be more in Uttar Pradesh (33 percent) than farmers at All India level (29 percent) and this implies that they not only understood the idea of MSP but also knew the agency (if not the name, its location) to which they could sell their crops if its market price fell below MSP. The remaining 66.7 percent did not know or understood the concept of MSP. Only 5 percent of farmer in Uttar Pradesh had heard of WTO and had some idea of its objective and activities. What we find is that the position of Uttar Pradesh is not very different from the All India situation. The relationship is highlighted in the accompanying graph.

Graph 2: Percentage of Literates and Awareness on Various Dimensions



The fact that emerges is that the percentage of literate farmers is lower by 5 percentage points in Uttar Pradesh as compared to the literacy level of farmers of India as a whole. The literacy aspects measured on various dimensions also does not leave Uttar Pradesh far behind the status of Indian Farmer. On the whole we can say that to achieve more growth in agricultural sector we should try to educate our farming community who will finally help to exploit the resources fully.

V. Sources and Quality of Information to Farmers

India, being a large agrarian economy with most of its rural population subsisting on farming, needs reframing of the economy to improve its farming community. As

observed by Chandrashekhar and Ghosh: "It is obvious that if India is to come anywhere near being a "knowledge society", a preliminary requirement is that farmers, who still constitute around 60 percent of the labour force and support around two-thirds of the population with their income, must have good quality access to the best knowledge (which does not always mean the latest knowledge) regarding agricultural techniques."

In this section we look at the knowledge base of the farmer and the sources of information available to him on the basis of the recent NSS report on Situation Assessment Survey of Farmers during 2003 based on NSS 59th round. Data for the survey were collected from 51770 farming households in 6638 sample villages from across the country. A farmer for this survey was identified as a person who possessed some land and performed agricultural activities on any part of that land during the 365 days preceding the date of survey. A farmer household was termed as a household in which there was at least one farmer. Agricultural activities included cultivation of field and horticultural crops, growing of trees or plantations such as rubber, tea, etc. and animal husbandry, fishery, sericulture, etc. This report deals with accessing of information on modern technology related to farming through different sources. It also reports on the perception of the farmer households on the quality of information received as well as their suggestions for improvement of extension services.

Table 4: Percent of Farmer Households Accessing Different Sources in U.P.

Source	Percent of HHs accessing the source	Source	Percent of HHs accessing the source
Participation in training	0.6	Other Progressive Farmers	18.9
Krishi Vigyan Kendra	0.5	Farmer's study tour	0.3
Extension workers	2.2	Para technicians/private	0.5
Television	6.5	agency/NGO	
Radio	15.0	Primary cooperative siciety	2.5
Newspaper	4.0	output buyer/food processor	1.3
Village Fair	1.7	credit agency	0.6
Govt. Demonstration	0.8	others	2.1
Input Dealer	8.3	any source	36.3

Source: NSS Report No. 499: Access to Modern Technology for Farming, 2003.

The NSS survey reports that the overall picture is not very promising as during 2003 in Uttar Pradesh only 33.6 percent of farmers accessed information on modern

technology or to be more appropriate almost 67 percent farmer households had not accessed any source of information on modern technology during the last 365 days. There were only two sources which were accessed by more than 10 percent farmer households: other progressive farmers (18.9 percent) and Radio (15.0 percent). Television served as a source of information on modern technology to 6.5 percent households and input dealers to 8.3 percent. Whereas 2.2 percent households had received information from extension workers, 2.5 percent received information from primary cooperative societies. The most striking feature that emerged from the survey is that public agencies played almost negligible role.

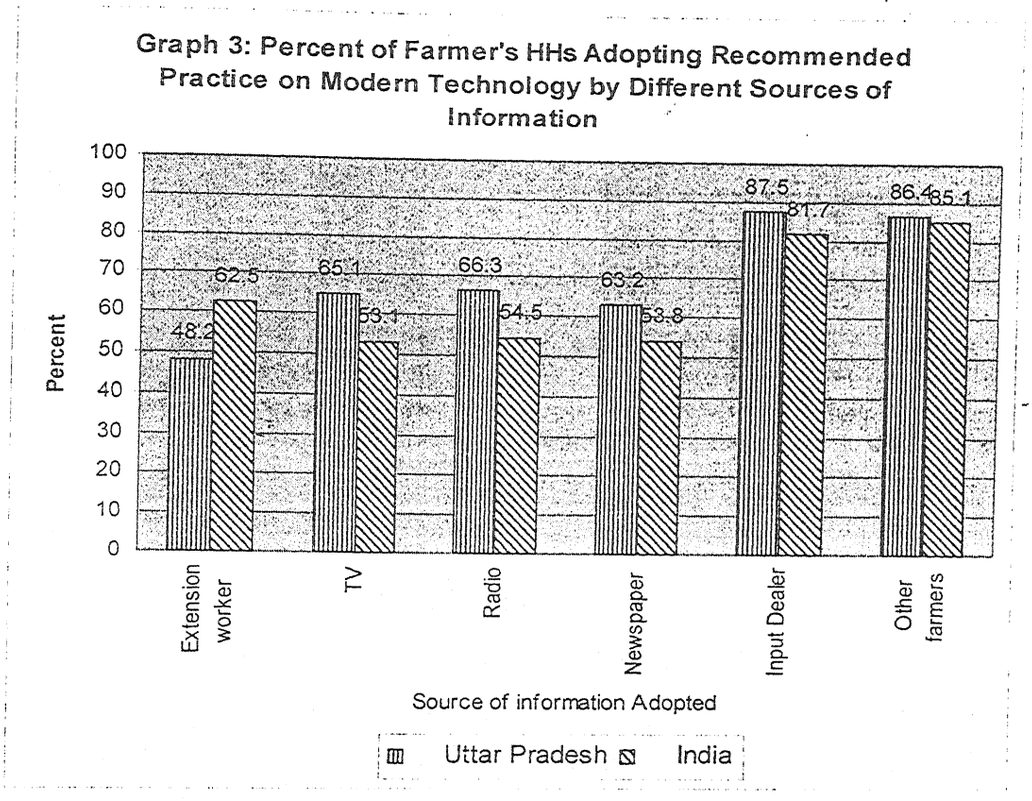
Only 48.2 percent of farmers accessed and adopted information from government agencies like agricultural extension workers, government demonstrations and Krishi Vigyan Kendra (Graph 3). Other farmers provided information to around 86.4 percent of farmers and input dealers to 87.5 percent helped adopt the recommended practice on modern technology. Table 4 highlights the issue that Uttar Pradesh is not behind Indian Farmer in adopting various source of information in upgrading their farming techniques. Substantial variation exists across States in terms of the proportion of farmers trying to get information on new technology. Chart 2 shows the evidence how State like Uttar Pradesh emerges on the measurement scale.

Table 5: Percent of Farmers Adopting Recommended Practice by Source

State	Source of information					
	Extension worker	TV	Radio	Newspaper	Input Dealer	Other farmers
Uttar Pradesh	48.2	65.1	66.3	63.2	87.5	86.4
India	**62.5**	**53.1**	**54.5**	**53.8**	**81.7**	**85.1**

Source: NSS Report No. 499: Access to Modern Technology for Farming, 2003.

It is worth noting that the public dissemination service on new agricultural technology has not influenced the farmer community much. A very small proportion of the information is furnished by this source. At this front government needs prompt effort. The role extended by the extension workers is a critical issue in this field. Table 5 highlights the fact that farmers do rarely rely on the recommendations provided by them instead emulate other progressive farmers and input dealers in Uttar Pradesh.



The NSS report also throws light on the quality of information received through different sources of information. As shown in Table 5 more than 50 percent of farmer households reported the quality of information from different sources such as extension workers, TV, radio, newspaper, input dealers and progressive farmers as good. At the state level there were variations in the quality of service provided by the extension workers. A lot remains to be achieved. India has to go a long way through to fully traverse the path set for knowledge society and changing its farmers to be knowledge workers themselves.

Table 6: Percent of Households Reporting Good Quality Information Received On Modern Agricultural Technology through Different Sources

States	Extension worker	TV	Radio	Newspaper	Input Dealer	Other Progressive Farmers
Uttar Pradesh	35.9	55.2	63.6	54.4	52.9	58.6
India	51.1	59.0	55.5	55.9	50.5	52.8

Source: Based on NSS Report No. 499: Access to Modern Technology for Farming, 2003.

Graph 4: Good Quality information on Modern Agricultural Technology Through Different sources

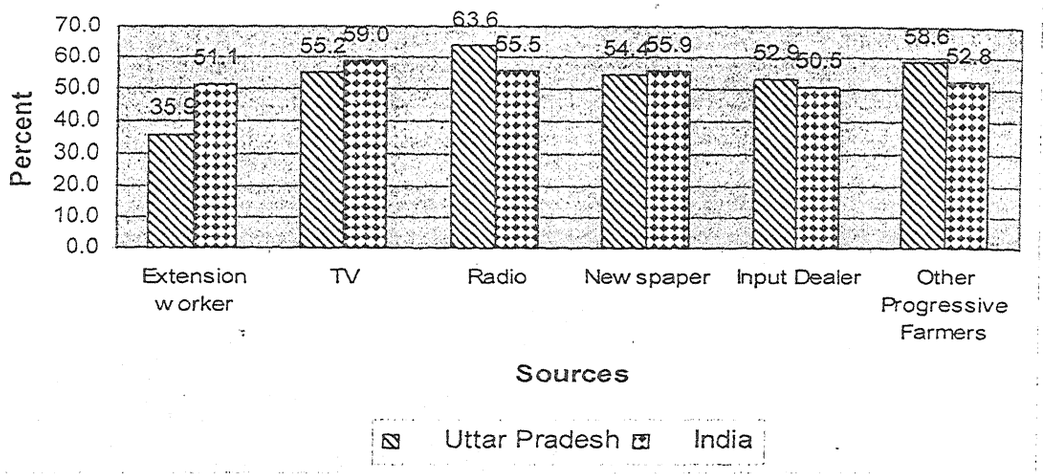


Table 7 shows the response of farmers for improvement in extension services for different sources of information accessed by them. Over 40 percent of farmer households desired improvement in quality and reliability of information furnished. Emphasis was also laid on timeliness of information. Less than 12 percent farmers said that the competence of the information provider needs to be improved.

Table 7: Percent of Framer Households Providing Suggestion For Improvement in Extension Services

State	Percent of Farmer Households Suggesting Improvemment in extension Services					
	Extension worker	TV	Radio	Newspaper	Input Dealer	Other farmers
Improvement in quality and reliability of information	22.9	35.7	39.1	40.1	41.8	39.5
Timeliness of information	22.1	19.6	20.2	15.6	19.9	16.7
Increase in frequency of demonstration	14.0	20.7	11.1	14.7	5.3	3.4
inmprovement of quality of presentation	2.1	6.2	7.2	4.8	8.4	4.9
Improvement of professional competence of information provider	8.3	4.2	2.8	6.8	10.1	11.7
Others	11.1	8.5	16.3	11.8	11.8	22.9

Source: Based on NSS Report No. 499: Access to Modern Technology for Farming, 2003.

VI. Concluding Remarks

It is apparent from the above discussion that if Uttar Pradesh has to land somewhere near being a agriculturally developed society, the basic pre-requisite is that its farmers must have good quality access to the best knowledge. Presently the Indian farmer is no where near being even minimally empowered in this respect. An appropriate development strategy has to be chalked out to overcome the problems that ensues the knowledge revolution in the agricultural community. The limited role and ineffectiveness of the public agricultural extension services is a matter of serious concern. Reduction of public expenditure on extension services, inadequate training, large number of vacant posts, inadequate support in terms of transport and cellphones to help them communicate effectively are some of the factors responsible for this situation. Public extension services have to be strengthened in terms of resources, trained manpower and adequate infrastructure support. Arrangements for continuous training and upgrading of knowledge of the extension worker have to be put in place. The challenges are indeed large. We see striking new economic and social phenomena in the knowledge economy starting from the areas that seems to be least apparently connected to frontier knowledge but are the most basic and possibly the hardest to be tackled.

References

Barro, Robert J. (1991), "Economic Growth in a Cross-Section of Countries", *Quarterly Journal of Economics*, 106 (2), 407-444.

Bregman, A and A. Marom (1993), *Growth Factors in Israel's Business Sector, 1958-1988*, Discussion Paper 93.02. Bank of Israel Research Department, Jerusalem.

Chadha, G.K. (2003), "What is Dominating the Indian Labour Markets? Peacock's Feathers or Feet?" Presidential Address, 45th Annual Conference, Indian society of Labour Economics, Jadhavpur University, Kolkata, December 15-17.

Chandrashekhar C.P.and Jayati Ghosh (2005), "New "Knowledge" and the Framing Community", macroscan.com, August 1st.

CII, (2004): Uttar Pradesh - An Agenda for Growth, Confideration of Indian Industries, Northern Region, October.

Clark, J.M. (1923) : Studies in the Economics of overhead Costs, University of Chicago Press, Chicago.

Datt, Ruddar (2002), "Economic Liberalisation and its implications for Employment in India" in Ashok Mathur and P.S.Raikhy (eds), *Economic Liberalisation and its Implications for Employment in India*, Deep and Deep Publications, New Delhi.

Denison, Edward. F (1982) "The Sources of Economic Growth in the United States" National Bureau of Economic Research, New York.

Feenstra , R.C., D Madani, T.H. Yang and C.Y.Liang (1999), "Testing Endogenous Growth in South Korea and Taiwan", *Journal of Development Economics*, 60 (2): 317-341.

Govt. of Uttar Pradesh : Tenth Five Year Plan , U.P. 2002-2007. Volume -1 (Part -I).

Kumar, Nomita P. (2003): "Changing Scenario of workforce in Uttar Pradesh in the Post reform Period" in Indian Journal of Labour Economics, Conference Volume, Vol. 47, Number 4, October-December.

Lucas, R.E. (1988), "On the Mechanics of Economic Development", *Journal of Monetary Economics*, 22(1), 3-22.

Mankiw, N. Gregory, David Romer and David Weil (1992), "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics* 107 (2), 407-437.

Planning Commission (2001), *India as a Knowledge Superpower: Strategy for Transformation,* Government of India, New Delhi.

_____(2002),"Report of the Committee on India Vision 2020", Govt. of India, New Delhi, December.

Romer, Paul M (1989), *Human Capital and Growth: Theory and Evidence*, NBER Working Paper 3173, National Bureau of Economic Research, Cambridge, Mass.

Sachs JD, N Bajpai and A Ramiah (2002), 'Understanding Regional Economic Growth in India', Harvard University, Centre for International Development Working Paper No 88.

Sakellariou, C.N. (2001), "Identifying the External Effects of Human Capital: A Two-Stage Approach", *Applied Economics Letters*, 8(3): 191-194.

Solow, Robert (1957), "Technical Change and the Aggregate Production Function", *Review of Economics and Statistics*, August.

Wang, F.Y and A. Modi (1997), "Explaining Industrial Growth in Coastal China: Economic Reforms.... And What else?", *World Bank Economic Review*, 11 (2): 293-325.

Winter-Ebmer, R (1994), "Endogenous Growth, Human Capital and Industry Wages", *Bulletin of Economic Research*, 289-314.

World Bank (1998), *World Development Report*, Washington, D.C.

_____ (2003), *Lifelong Learning in the Global Knowledge Economy Challenges For Developing Countries,* Washington, D.C.

World Bank Institute (2001), *Korea and the Knowledge-Based Economy*, Washington, D.C.

PUBLIC INVESTMENT IN AGRICULTURE IN UTTAR PRADESH : TRENDS, CONSTRAINTS AND PROSPECTS

By

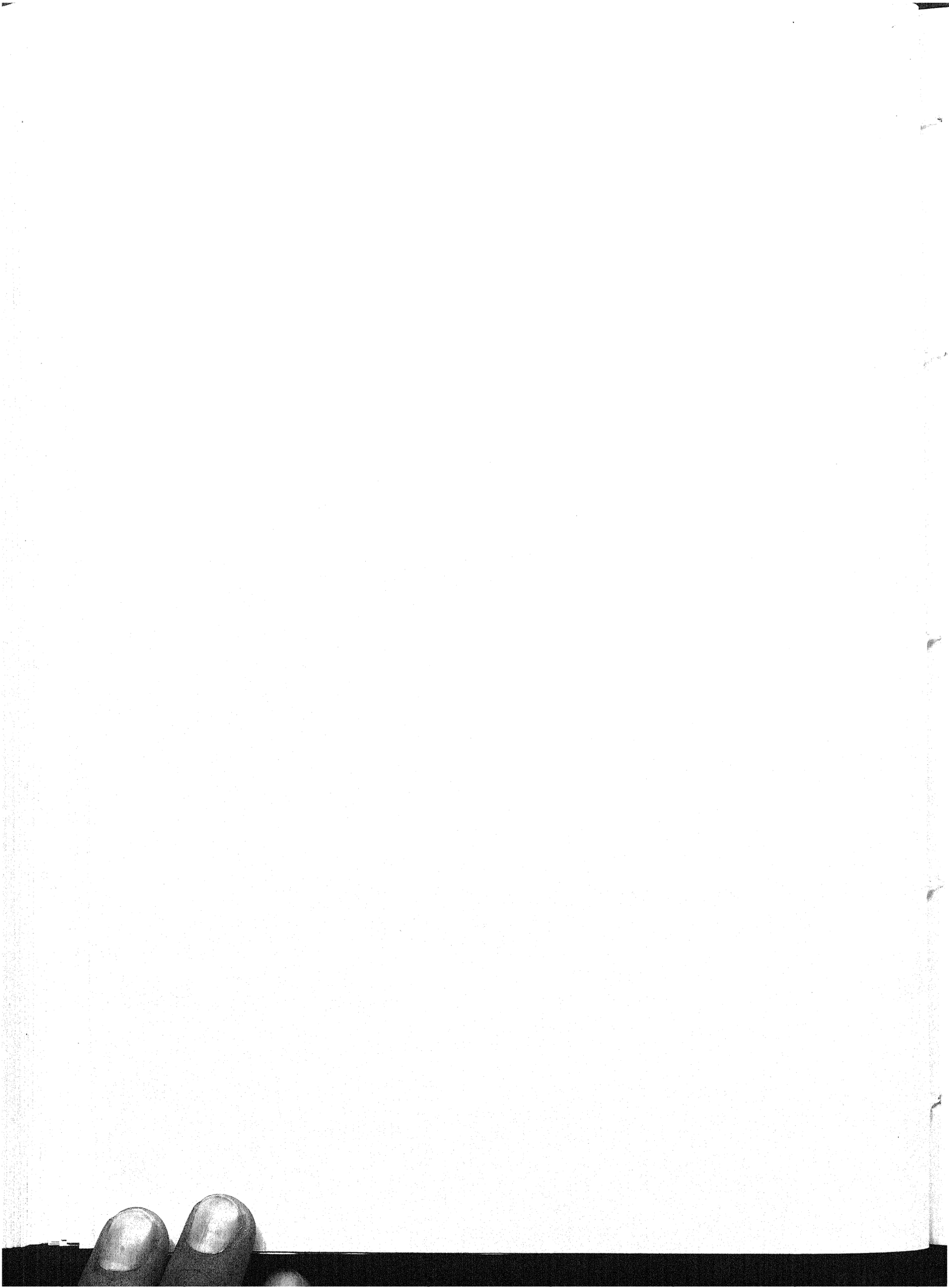
POONAM SINGH

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Public Investment in Agriculture in Uttar Pradesh: Trends, Constraints and Prospects

Poonam Singh

Even after more than four and a half decades of planned economic development, agriculture continues to dominate the economic panorama of India in as much as it contributes a little less than one-third of the country's GDP and about one-fifth of its foreign exchange earnings. Any change in this sector, positive or negative, has a multiplier effect on the entire economy.

Sustained agricultural growth is a sine qua non for accelerating the pace of overall economic development and sustained agricultural growth, among other things, requires a constant expansion in the productive capacity of agriculture, which, *inter alia,* implies unremitting enhance in capital formation in agriculture. In the recent years an intense debate has been waging among economists of the country about the trends in investment and the relationship between public and private investment in agriculture in the light of the decreasing trend in investment in agriculture since the mid-eighties. The decline in public investment in agriculture in real terms during the 1980-81 is viewed as a matter of serious concern by no. of economists and scholar.

There have been several attempts to evaluate different dimensions of capital formation in Indian agriculture. A few of these include studies by (Rath, 1989; Shetty, 1990; Mujumdar and Menon, 1991; Kumar, 1992, Mallick, 1993; Dhawan and Yadav, 1995; Gandhi, 1996,Misra, 1998; Chand Ramesh, 2000 and 2001; Roy & Pal, 2002).

The opposite phenomenon of a rising trends in private investment and a declining trend in public investment in agriculture led many researchers to conclude that there is a strong complementarity between public and private investment in Indian agriculture. However, these arguments are mostly based on aggregate analysis (all–India level) and hence do not reflect the regional picture.

India is a vast country with significant regional variation in investment pattern in agriculture. However, it is expected that more fragile regions like Uttar Pradesh would be more disadvantage in provisions of attracting investment, both public and private. Resource base in terms of land, water and forest in Uttar Pradesh has depleted and productivity levels are generally low. So it is

considered as one of the BIMARU states (one of the poorest states in India) whether it contributes a significant part of the agricultural output of the country. So the conditions have led to a serious sustainability question in the state.

The State of Uttar Pradesh situated mainly in the fertile Ganga Plain, one of the oldest settled area, has the advantage of a better environment conducive for the agricultural development. However, there are marked regional inequalities in the pace of development. Development of agriculture in Uttar Pradesh, the most populous state of India, has been a focal theme for discussion at various levels among economists. Several studies highlighted the significant inter-regional variations in overall economic as well as agricultural development of Uttar Pradesh. Most of the studies pointed that Eastern region is less developed than Western region of the state in every dimension of economic development (Sinha, 1979; Sen, 1979; Subbarao, 1980;Singh, 1981, 1987, 1997) .

The present paper seeks to contribute to the ongoing debate on investment in agriculture, which discusses the trends in capital formation in state agriculture during the period 1980-81 to2001-02, and also analyze the factors underlying these trends in capital formation in agriculture in Uttar Pradesh. This paper is divided into three sections. The first section analyzes the trends in capital formation in agricultural sector in Uttar Pradesh on account of public sector over the past two decades. Section two identifies new challenges and main constraints that are facing Uttar Pradesh agriculture. Section three deals with new directions for future in order to have increased contribution of agricultural sector to economic growth in the state of Uttar Pradesh.

Trends

Number of economist have stressed the importance of public investment in the production of large number of modern input such as fertilizer' pump sets, tractors and in infra structure consisting of transport storage energy etc. for the development of the agriculture sector in the country in general and in the state particular. Public expenditure on rural roads, rural electrification, rural markets, rural education and storage etc. is considered more relevant than investment in agriculture for the growth of agriculture sector.

Table-1

Gross capital formation in agriculture in U.P.
in relation to Net State Domestic Product in agriculture & Net State Domestic Product
(At 1993-94 prices) Rs. Crore

Year	GCFagUP.pu	NSDPag	NSDP	GCFagUP.pu as %of NSDPag	GCFagUP.pu as %of NSDP
1980-81	1043.02	20214	46004	5.16	2.27
1981-82	939.06	20659	47107	4.55	1.99
1982-83	817.93	21637	50787	3.78	1.61
1983-84	807.36	22552	52780	3.58	1.53
1984-85	798.77	22518	53618	3.55	1.49
1985-86	909.42	22747	55719	4.00	1.63
1986-87	825.00	23322	58132	3.54	1.42
1987-88	768.49	23748	60758	3.24	1.26
1988-89	754.36	26265	68681	2.87	1.10
1989-90	736.21	25789	70592	2.85	1.04
1990-91	714.42	27673	74791	2.58	0.96
1991-92	401.93	28405	75096	1.41	0.54
1992-93	470.50	27750	75904	1.70	0.62
1993-94	463.30	28357	70934	1.63	0.65
1994-95	370.14	29370	74635	1.26	0.50
1995-96	342.74	29885	77046	1.15	0.44
1996-97	665.20	32687	85563	2.04	0.78
1997-98	532.68	30296	84340	1.76	0.63
1998-99	466.20	30751	85344	1.52	0.55
1999-00	535.00	33543	91027	1.59	0.59
2000-01	623.49	32897	94612	1.90	0.66

GCFagUP.pu: Gross capital formation in agriculture in U.P. in public sector

NSDPag: Net State Domestic Product in agriculture

NSDP: Net State Domestic Product in aggregate

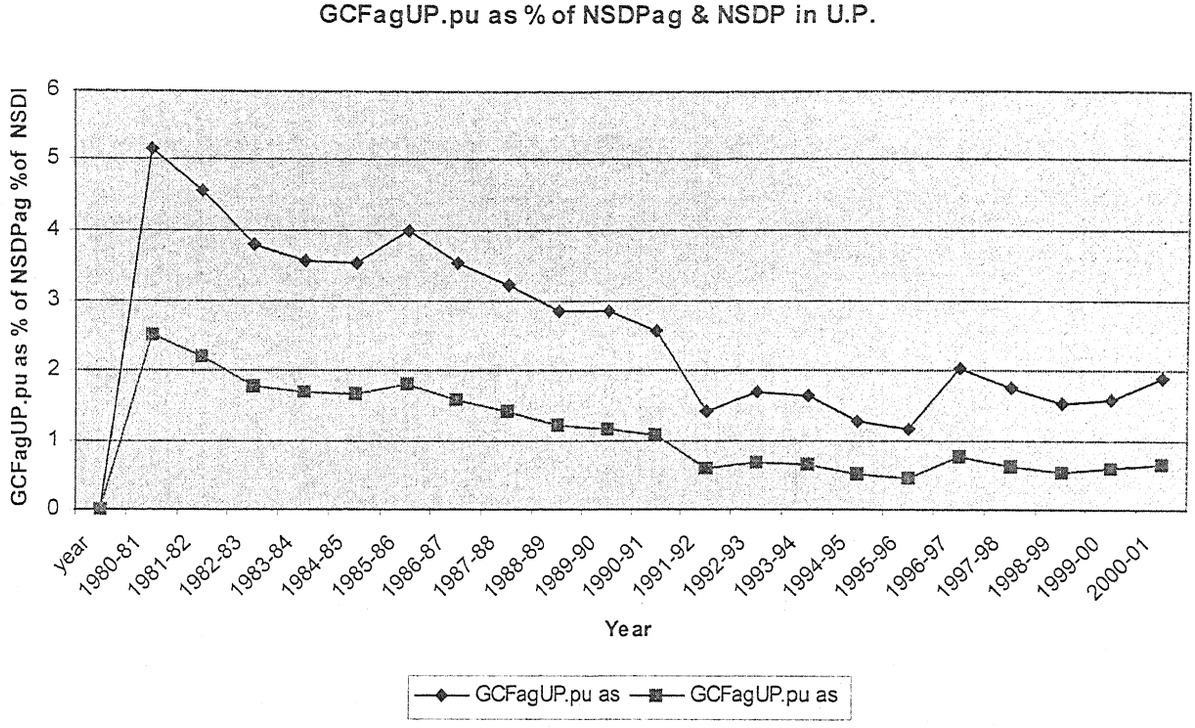
Source: (i) Calculated from the data published in "Economic and Work related classification of income-expenditure of Uttar Pradesh" Yearly magazine of Economic and Statistical Division, State Planning Institute, Uttar Pradesh, Lucknow, Various issues.

(ii) Economic and political weekly research foundation 2003.

Estimates of Gross capital formation in agriculture for public sector in Uttar Pradesh presented in Table 1 reveals a declining trend in real terms (at 1993-94 prices) for the whole period of1980-81 to2000-01, with some fluctuations. At 1993-94 constant prices, public investment in state agriculture plunged to Rs. 623.49 Crore in2000-01 from Rs 1043.02 in 1980-81.Gross capital formation in agriculture in Uttar Pradesh as a proportion of net state domestic

product in agriculture and also net state domestic product aggregate has been declining in public sector, leading to an over all slouch, as presented by the Figure-1 and table-1

Figure-1



More notably, there is more blunt declining growth rate in the decade of 1990s i.e. the post economic reform period, compared to 1980s. This was over 5% in the beginning of 80s and had fallen steadily to 2.58 % in the 1990-91 and is accounted to decline to 1.9% in 2000-01..

Similar trends also reflected in the percent growth rate of GFCF in agriculture of the state in relation with NSDP in agriculture and aggregate NSDP, as presented in table-2 and in figure-2. The GFCF in agriculture of the state at constant prices has declined from Rs. 1053.4 Crore in 1980-81 to Rs708.0 Crore in 1990-91and Rs 613.4 Crore in 2000-01.

Table-2

Gross Fixed Capital Formation in agriculture in U.P.
in relation to Net State Domestic Product in agriculture & Net State Domestic Product in U.P.
(At 1993-94 prices)
Rs. Crore

Year	GFCFagUP.pu	NSDPag	NSDP	GFCFagUP.pu as %of NSDPag	GFCFagUP.pu as% of NSDP
1980-81	1053.4	20214	46004	5.21	2.29
1981-82	934.6	20659	47107	4.52	1.98
1982-83	811.8	21637	50787	3.75	1.60
1983-84	830.0	22552	52780	3.68	1.57
1984-85	808.2	22518	53618	3.59	1.51
1985-86	765.2	22747	55719	3.36	1.37
1986-87	820.8	23322	58132	3.52	1.41
1987-88	751.6	23748	60758	3.16	1.24
1988-89	754.8	26265	68681	2.87	1.10
1989-90	699.6	25789	70592	2.71	0.99
1990-91	708.0	27673	74791	2.56	0.95
1991-92	410.3	28405	75096	1.44	0.55
1992-93	426.6	27750	75904	1.54	0.56
1993-94	469.0	28357	70934	1.65	0.66
1994-95	357.7	29370	74635	1.22	0.48
1995-96	402.1	29885	77046	1.35	0.52
1996-97	529.4	32687	85563	1.62	0.62
1997-98	479.4	30296	84340	1.58	0.57
1998-99	471.8	30751	85344	1.53	0.55
1999-00	532.8	33543	91027	1.59	0.59
2000-01	613.4	32897	94612	1.86	0.65

GFCFagUP.pu: Gross Fixed capital formation in agriculture in U.P. in public sector

Source: Same as Table 1.

Figure-2

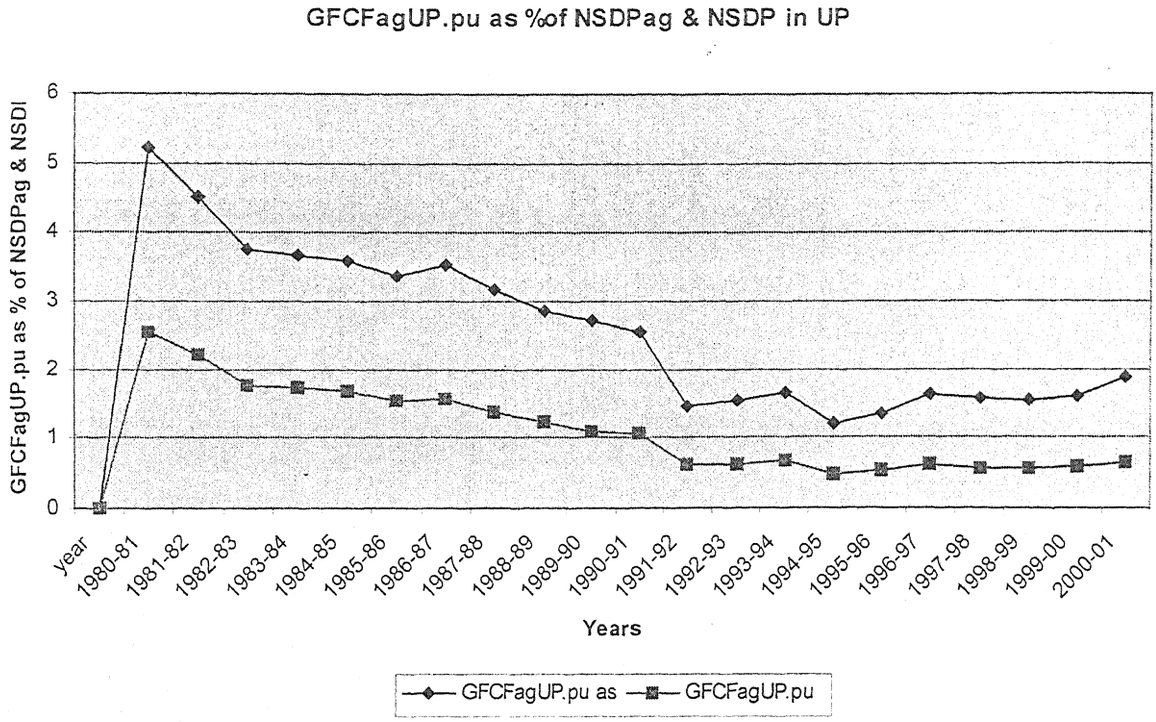


Table-4 represents the annual compound growth rate of gross capital formation & gross fixed capital formation in state agriculture. The pace of investment in agriculture has slackened in the 1990s steadily .A negative Compound growth rate of gross capital formation -3.42% in state agriculture in eighties, turn out to be –1.23% in 90s persistently. Following this trend Compound growth rate of gross fixed capital formation which was –4.01% in 1980s turn into – 1.30 % in 1990s.

Table-4

Compound Growth Rate of Gross Capital Formation & Gross Fixed Capital Formation in agriculture by Public sector of Uttar Pradesh (At 1993-94 prices)

(%)

	GCFagUP.pu	GFCFagUP.pu
1980-81 to 1989-90	-3.42	-4.01
1990-91 to 2002-03	-1.23	-1.30
1980-81 to 2002-03	-2.42	-2.54

Table-3 represents gross capital formation and gross fixed capital formation in agriculture in public sector in as ratio of aggregate gross capital formation and gross fixed capital formation in public sector which shows again declining trend since 1980-81. Gross capital formation in agriculture by public sector, in relation with aggregate gross capital formation was 53.33% in1980-81, turn out to be 30.07% 1990-91 and 29.65% in 2000-01 respectively.

Table-3

Gross Capital Formation and Gross Fixed Capital Formation in agriculture in U.P. in relation to aggregate Gross Capital Formation and Gross Fixed Capital Formation (At 1993-94 prices)

Rs. Crore

Year	GCFagUP.pu	GFCFagUP.pu	GCFUP.pu	GFCFUP.pu	GCFagUP.pu as %of GCFUP.pu	GFCFagUP.pu as %of GFCFUP.pu
1980-81	1043.02	1053.4	1955.9	1772.56	53.33	59.43
1981-82	939.06	934.6	1558.5	1838.68	60.25	50.83
1982-83	817.93	811.8	1340.5	1559.72	61.02	52.05
1983-84	807.36	830.0	1668.2	1947.25	48.40	42.63
1984-85	798.77	808.2	1683.9	2018.22	47.44	40.05
1985-86	909.42	765.2	1909.4	1873.95	47.63	40.83
1986-87	825.00	820.8	1958.6	1993.32	42.12	41.18
1987-88	768.49	751.6	2008.1	1953.67	38.27	38.47
1988-89	754.36	754.8	1836.3	1825.60	41.08	41.34
1989-90	736.21	699.6	1597.1	1487.54	46.10	47.03
1990-91	714.42	708.0	2375.8	2222.75	30.07	31.85
1991-92	401.93	410.3	1421.3	1510.29	28.28	27.17
1992-93	470.50	426.6	1962.3	1801.33	23.98	23.68
1993-94	463.30	469.0	1592.7	1703.57	29.09	27.53
1994-95	370.14	357.7	1696.8	1693.89	21.81	21.12
1995-96	342.74	402.1	578.4	688.76	59.26	58.38
1996-97	665.20	529.4	1656.6	1678.15	40.16	31.55
1997-98	532.68	479.4	1620.5	1513.36	32.87	31.67
1998-99	466.20	471.8	1798.7	1855.87	25.92	25.42
1999-00	535.00	532.8	2026.5	1668.65	26.40	31.93
2000-01	623.49	613.4	2103.0	1846.81	29.65	33.22

Source: Same as Table 1.

Constraints

There has been perceptible decline in public sector investment in agriculture. Agricultural development policies, in particular investment policy followed during the decade, can be said, as neglect of agriculture which still dominates Uttar Pradesh economy with about 40 percent of net state domestic product coming from the agriculture sector.

Increasing subsidy is probably the prime constraint in the growth of public expenditure in the state agriculture.

Illiteracy of the farmers, inequitable land tenure system, poor irrigation facilities, low technology and lack of capital adversely affect the intensity of cropping yield of crops and finally the total out-turn in large parts of the State, which affect private investment in agriculture directly.

The economic development of Uttar Pradesh revealed the fact that State economy is characterized by significant inter-regional variations in overall economic as well as agricultural development. Eastern region of the State is particularly known for its poverty and backwardness, while Western region is regarded as one of the agricultural more developed and prosperous regions of the country. In Eastern U.P. agriculture was a very low paying business because holdings were small and scattered and prevailing technology made large-scale investments in agriculture both risky and uneconomic which led to neglect and to capital starvation, which depressed returns for agriculture, therefore, agriculture sector in Eastern U.P. received a very low priority in both private and public investment allocations.

Improvement in infrastructure facilities like irrigation, etc. requires public investment whether U.P. was sunk in stagnation because of unequal distribution of public expenditure and lack of incentives for private investment in undeveloped regions of the State.

On the issue of access to credit, which is recognized as a major positive determinant of private investment, inter-class differences in credit per hectare was much greater in Eastern U.P. as compared to Western U.P. due to constraints on the demand side.

Concluding Remarks

- There is a need to examine closely at the global trends and explore the emerging opportunities.
- Diversifying the crop base into cash crops and increasing the production of livestock and poultry will help in reducing the pressure of land from food grain production
- The policymakers need to recognize the growing importance of vertical coordination of agricultural markets, quality assurance, and the role of international market information.
- Fostering private initiative in production, marketing, and distribution is essential to increase the efficiency of the food distribution system. Developing institutions to meet these new needs is also fundamental for making progress in the agricultural sector.
- It is also important to integrate high yielding short duration legumes into the existing rice-wheat cropping system in order to have positive environmental benefits. Fruits and vegetables can be produced for export in domestic markets.
- Market reforms related to rationalization of input subsidies and removal of all restrictions in terms of stocking limits, movements, and levies in transporting food grains should be implemented.
- Institutional innovations such as warehouse receipt system, futures trading, and commodity exchanges should be established to tap international markets.
- Developing institutions for certifying quality characteristics of agricultural produces will go a long way in enabling farmers to reach out to international markets.
- Institutional reforms, particularly in input supplying agencies and in irrigation systems should be undertaken.
- Encouraging farmers associations and cooperatives to build collective bargaining power and to enter into contracts with agro processors and supermarkets is essential

References

Chand Ramesh (2000), " Emerging Trends and Issues in Public and Private Investment in Indian Agriculture: A State-wise Analysis", Indian Journal of Agricultural Economics, vol. 56, no. 2, April-June.

Chand Ramesh (2000), " Emerging Trends and Regional Variations in Agricultural Investments and Their Implications for Growth and Equity, Policy Paper-11, National Center for Agricultural Economics and Policy Research, New Delhi.

Dhawan, B. D. and S. S. Yadav (1995), " Private Fixed capital Formation in Agriculture: Some Aspects of Indian Farmers Investment behavior", Economical and Political Weekly, Vol. 30, no. 30, Sept. 30.

Gandhi, Vasant P. (1996), " Investment Behavior in Indian Agriculture Sector", Indian Journal of Agricultural Economics, vol. 51, no. 4, Oct-Dec.

Kumar, A. Ganesh (1992), " Falling Agricultural Investment and Its Consequences", Economical and Political Weekly, Vol.27, no. 42, Oct. 17.

Mallick, Sushanta K. (1993), " Capital Formation in Indian Agriculture: Recent Trends", Indian Journal of Agricultural Economics, vol. 48, no. 4, Oct-Dec.

Misra, V. N. (1998), " Economic Reforms, terms of Trade, Aggregate Supply and Private Investment in Agriculture: Indian Experiences", Economical and Political Weekly, Vol. 33, no. 31, Aug. 1.

Mujumdar, N. A., and K. A. Menon (1991), " Saving and Capital Formation in Indian Agriculture", M.L. Dantwala (ed.), Indian Agricultural Development since Independent: A Collection of Essays, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.

Rath, Neelkanth (1989),"Agricultural Growth and Investment in India", Journal of Indian School of political Economy, Vol.I, no. Jan-June.

Roy, B. C. & Suresh Pal (2002), " Investment, Agricultural Productivity and Rural Poverty in India: A State Level Analysis", Indian Journal of Agricultural Economics, vol. 57, no. 4, Oct-Dec.

Sen, Sunil (1979), Agrarian Relations in India (1793-1947), Peoples Publishing House, New Delhi.

Shetty, S. L. (1990), "Investment in Agriculture : Brief Review of Recent Trends " Economical and Political Weekly, Vol. 25, no. 7-8, Feb. 17-24.

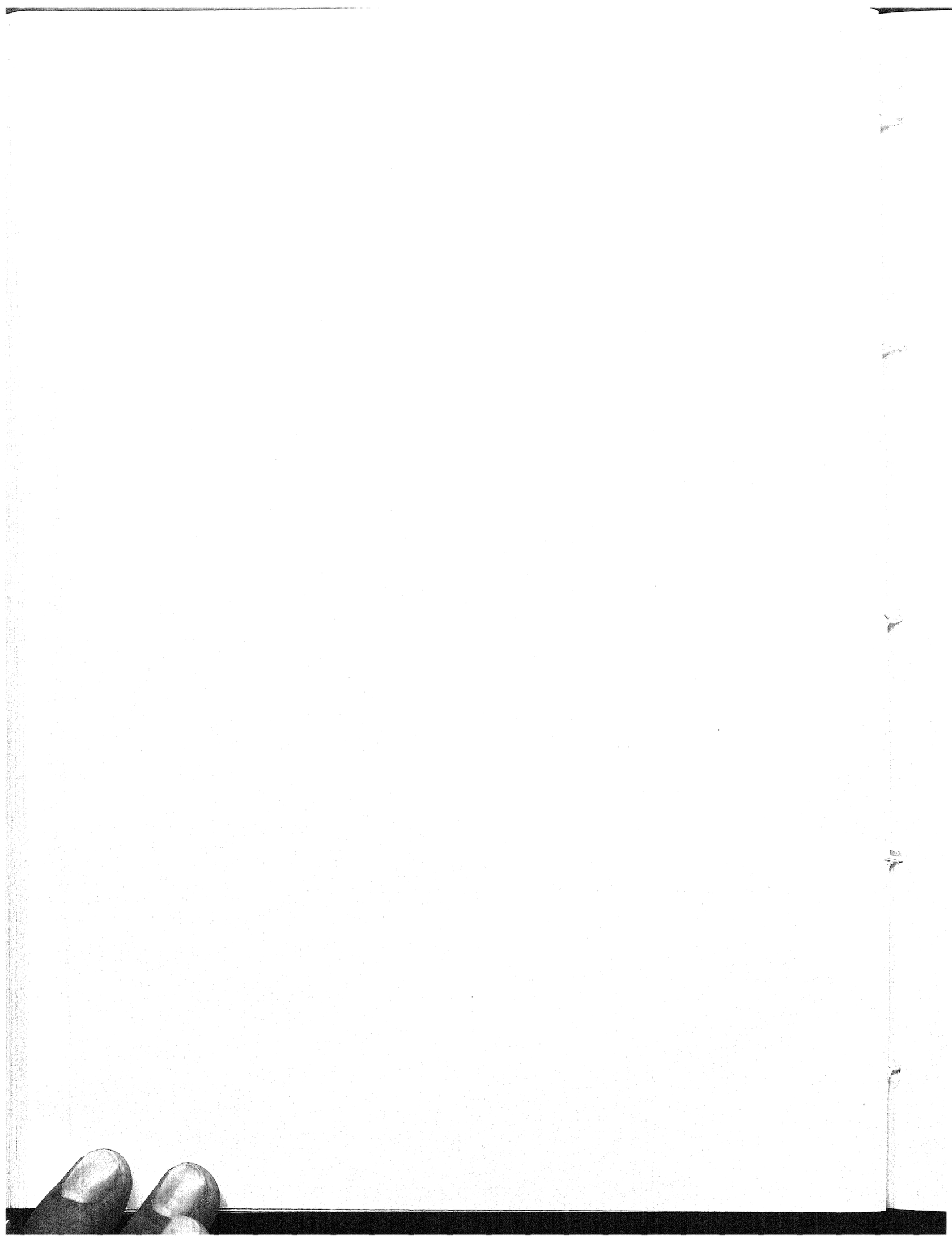
Singh, Ajit Kumar (1981), "Patterns of Regional Development : A Comparative Study", Sterling Publishers, New Delhi.

Singh, Ajit Kumar (1987), "Rural Poverty and Agricultural Development", Ashish Publishing House, New Delhi.

Singh, Ajit Kumar (1997), "Land Use, Environment and Economic Growth in India", M.D. Publications, New Delhi.

Sinha, R. C. (1979), " Agricultural Development and Rural Employment", in T. S. Papola (ed.) 'Studies Development of Uttar Pradesh', Giri Institute of Development Studies, Lucknoow.

Subbarao, K. (1980), " Institutional Credit, Uncertainty and Adoption of HYU Technology: A Comparison of East U. P. with West U.P.", Indian Journal of Agricultural Economics, vol. 35, no. 1, Jan-March.



Post reforms Agriculture in India:
How does a Resource-constrained Economy Respond?

Vidya Sagar

Agriculture in Rajasthan: Salient Features

- Low rainfall: Gradients increasing from the northwest (Below 20 cm) to south east (over 100 cm).
- Kharif crops, predominantly coarse grains and pulses cultivated in different regions according to the rainfall pattern
- Rabi crops: wheat cultivated in areas of intensive irrigation while gram and mustard in low intensity irrigation or no irrigation

Agriculture and the Economy Rajasthan: 1960-61 to 1980-81

NSDP Growth	1960-61 to 1970-71	1970-71 to 1980-81
Primary	2.1(ns)	1.4(ns)
Secondary	2.3	3.9
Tertiary	3.4	4.6
NSDP	2.5	2.7
Per Capita NSDP	0.1	-0.2

Agricultural Growth: Salient Features

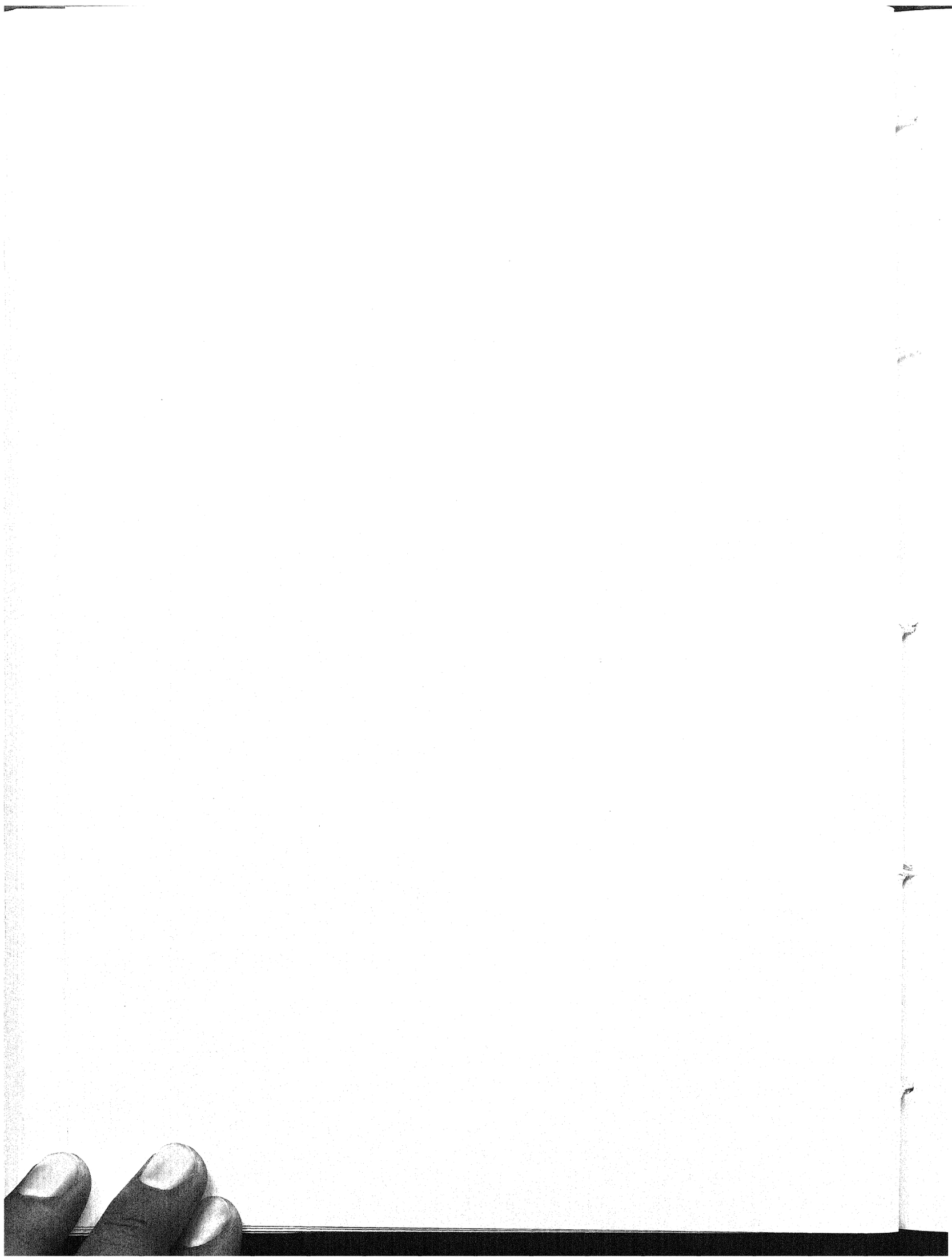
- Insignificant agricultural growth during the sixties and the seventies, in spite of the introduction of seed-fertilizer technology in wheat in irrigated areas. (Table-)
- Success story of the agriculture begins after the technology mission on oilseeds provides mustard varieties suitable for the state's agro-climates
- Rapid diversification in agriculture during the eighties

Salient Features..Agric. Diversification during 80s

- Annual Growth in agricultural production over 4 per cent during the eighties
- Growth of food grain production negligible.
- Growth in production of oilseeds and vegetables over 14 per cent, spices over 7 per cent, cotton over 4 per cent and similarly for guar and other non food crops such as spices.
- Decline in the area under both rabi (wheat) and kharif food grain compensated by over 4.5 per cent annual growth in productivity of food grain. (Restricting wheat cultivation to appropriate agro-environment).

Such an agric. Scenario achieved due to ...

- Fast growth in tech inputs-HYV, Irrigation and Fertilizer, contributing to a large part of production growth (Kumar), TFP growth high in wheat and Bajra and mustard. (Table-)
- Controlled increase in support price of wheat. Identical increase in the price of mustard seed (Figure-).



Agriculture during the 90s:

Arresting diversification: Back to cereals

- Low growth (g = 1.9) in Agric. Production caused mainly by increased area (Irrigation).
- Zero growth in aggregate agricultural productivity as well as productivity of individual crops
- Growth in the production of wheat (g=5.1%)
- Zero growth in the production of rabi oilseeds mainly mustard, cotton and vegetables. Kharif oilseed mainly soybean the only non-food crop showing growth.

Arrested Diversification: Stagnant productivity

- **Areas with superior irrigation environment under mustard shifted to wheat while mustard cultivation pushed to inferior agro-climates**
- **As a result wheat recorded no growth in productivity and mustard became vulnerable to rainfall fluctuations.**
- **This resulted in sharp fall in mustard production during the late nineties. Production of mustard drops to....**

Growth in Agricultural Production

Reference Period	All Crops	Food Crops	Non-food
[illegible]	4.50* (5.63*)	1.08 (1.86)	12.92* (15.0*)
[illegible]	1.93	3.50**	-0.67
[illegible]	3.91*	2.76**	6.95*

Figures in parenthesis in the first row show growth rates computed by ignoring the severe drought year 1987-88

Growth Rate of production of crops in Rajasthan

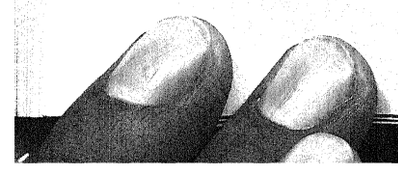
Crops	1980-81 to 1991-92	91-92 to 2001-02
Kharif Cereals	1.10	4.39
Rabi Cereals	1.70	4.76**
Kharif Pulses	-1.99	-1.53
Rabi Pulses	-5.68	0.08
Foodgrain	0.78	3.40
Kharif Foodgrain	1.65	4.01
Rabi Foodgrain	0.24	3.64***
Kharif Oilseeds	12.74*	6.81**
Rabi Oilseeds	16.73*	-0.15
Cotton	4.23	-0.29
Vegetables	14.52*	3.90
Cond. &spices	7.52*	4.57**

Growth in Tech. Inputs

	Growth rates		
	1980-91	1991-01	1980-
Net Irrigated Area	1.8	3.0	3.4
Gross irrigated	1.5	3.4	3.3
Fertilizer Consumption			
Kharif	11.2	9.0	12.4
Rabi	8.5	5.7	8.0
Total	9.5	7.2	9.7

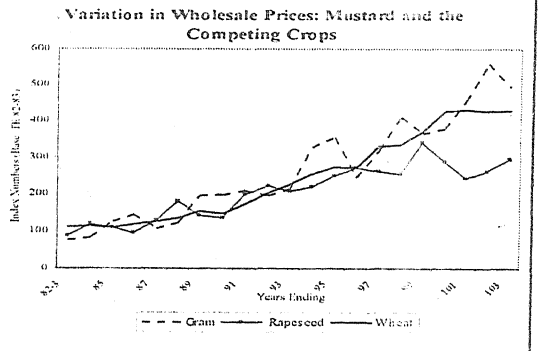
Agricultural Policies (1980s)

- **Technology and Price Support for Oilseeds**
- **Controlled Price Support for wheat during the eighties**
- **Rapid Expansion in Irrigation Capacity**
- **Fertilizer Stocks Policy: Growth in fertilizer consumption**



Agricultural Policies (1990s)

- Price Policy favoring wheat and Rice during the nineties: rapid increase in support price
- Agricultural Trade Liberalization leading to massive increase in Edible oils imports
- Imports of Edible oils increased from 2 lakh tons in 1992-3 to 21 lakh tons in 1997-8 and then to 44, 45 and 48 lakh tons in the subsequent three years. This seriously depressed mustard prices during the late nineties. Price ratio of Mustard to Wheat declined from 116 in 1991 to 57 in 2001.



- Public expenditure in economic services, predominantly agriculture, decline during the nineties
- R & D efforts to strengthen agriculture collapse;Extension services withdrawn
- This resulted in cropping pattern shift back to wheat, the time tested crop.
- With the international price of edible oils hardening there again is a shift in favor of mustard

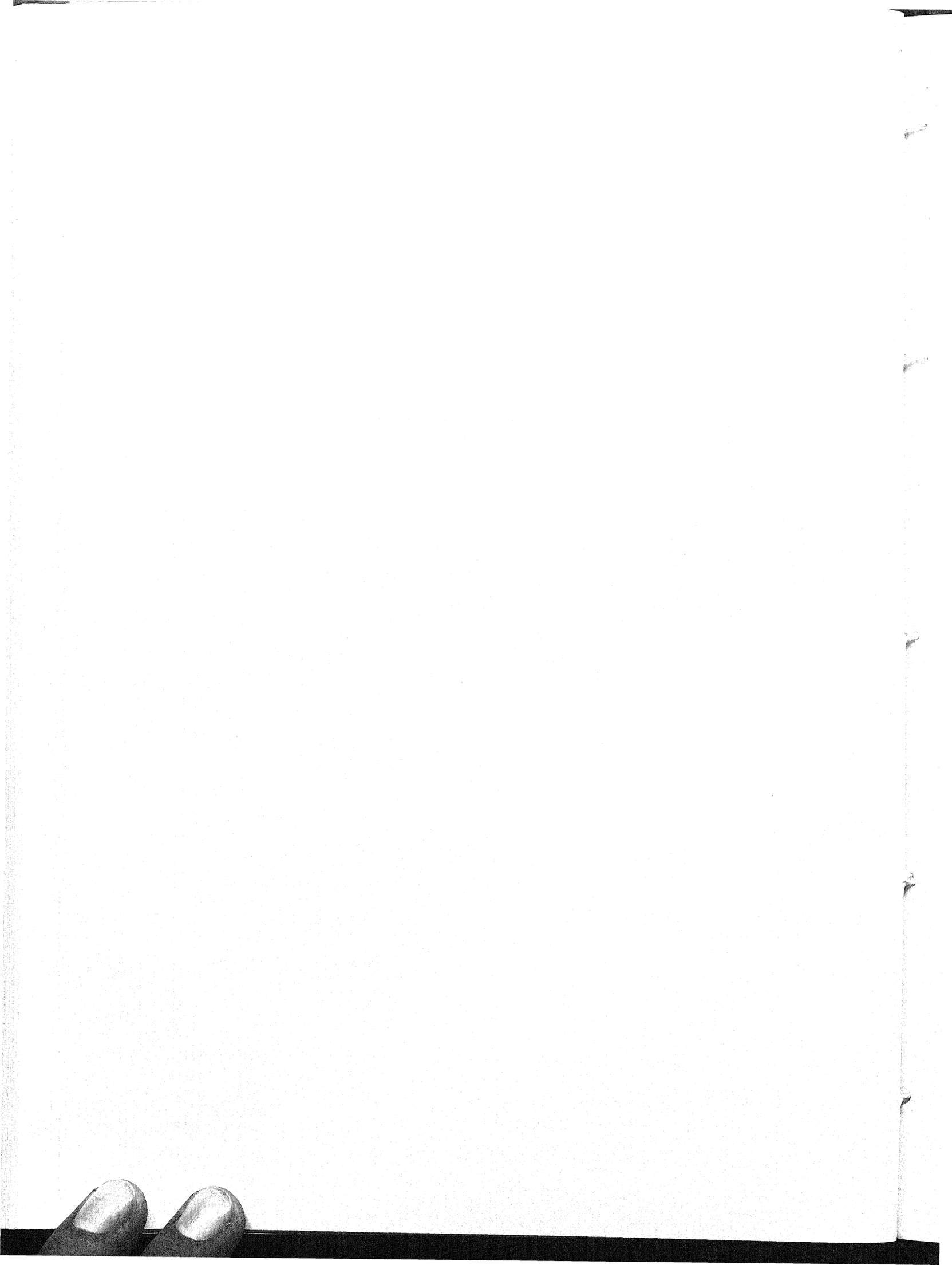
- We are back to square one. The MSP of Rs 1700 last year and 1725 this year.
- Market price Rs. 1500-1650
- With market prices well below Rs.1700 and with large unused stocks is likely to create a situation where industry may not lift the stock as happened in 1999-2000
- Procurement during rabi 2005 14L Tons
- In stock before rabi procurement 06. 12 L.T.
- Target procurement rabi-06, 20 lakh Tons

Net Social Gain from Agricultural Trade Liberalization *(Rs. Per capita)*

Crop	Rajasthan
Wheat & Rice	-25.6
Pulses	-62.3
Edible Oils	-78.3
Total	-166.2

Derived from Jha and Chand (2001),

- Together the three crops (Wheat, mustard and Pulses) imply a loss of Rs 166 per capita or Rs. 930 crore for the population of 5.6 crore.
- Clearly the impact of agriculture trade liberalization has been adverse to the interest of the state. If one adds loss of employment along with the reduced supply and hence taxes to the state from the processing of oilseeds or other crops, to the welfare loss due to depressed prices the aggregate loss would be further higher.



- *The Agricultural policies pursued during the nineties have been detrimental to the state's economy from the point of view of environment, employment and Agricultural Diversification*
- *Should the country prefer to import at lower prices or save domestic edible-oil sector may be a matter of wider policy, but small economies or regions, which specialize in a commodity or two would need support from the center to cope with such policies.*

Resource degradation: The Ground Water Status

No. of Blocks in different categories

Category	1984	1998	2001	2004
Over Exploited (>100%)	12	41	86	140
Critical (92 to 100%)	11	26	80	50
Semi Critical (70 to 90%)	10	34	21	14
Safe (< 70%)	203	135	49	32

Financial Liberalization:

Impact on Institutional credit

- The share of agriculture in total institutional credit declines *less* than the decline in its contribution to GSDP.
- CDR declines both in the RRBs and the SCBs
- Inequality increased in the disbursement of credit both from PACs and the SCBs during the 90s
- Interest rates for agricultural credit declines

Distribution of Term Credit by SCBs

Reference Period	Size of Holding			
Triennium ending	<1ha	1-2 ha	> 2 ha	All
Number of beneficiaries (per cent)				
1987-88	33.5	28.7	37.8	100
1997-98	32.3	23.8	44.4	100
Share in total disbursal				
1987-88	10.9	13.6	75.5	100
1997-98	9.5	10.8	79.6	100

Distribution of Cooperative Credit by PACs

Reference Period	Size of Holding			
Triennium ending	<1ha	1-2 ha	2-4 ha	All
Number of beneficiaries (per cent)				
1983-84	22.3	25.7	24.7	100
2001-02	15.0	26.0	25.7	100
Share in total disbursal				
1983-84	11.7	22.7	26.0	100
2001-02	7.3	18.3	26.0	100

- Revenue expenditure on Economic Services Declines rapidly since 1992.
- Share of Capital Outlay for Social Services increases steadily from 21% (1980-1) to 30% in 1990-1 and to 43 % in 2000-01 at the expense of Economic Services
- Rev. Expenditure on General Services increases steadily at the expense of Development expenditure after 1988

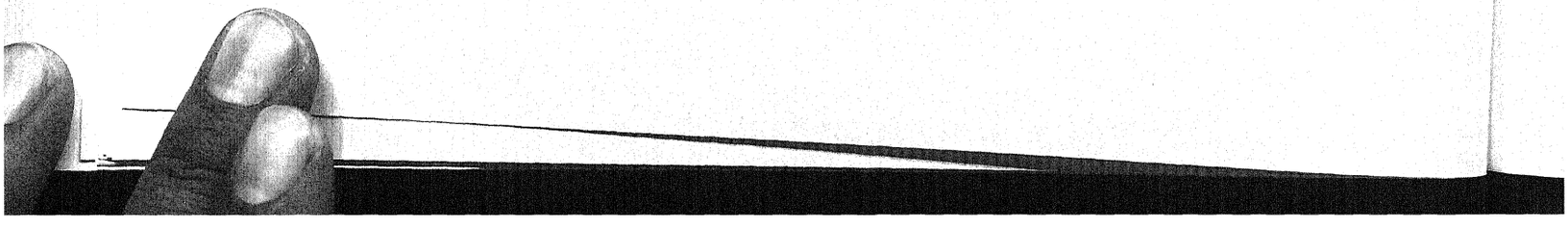
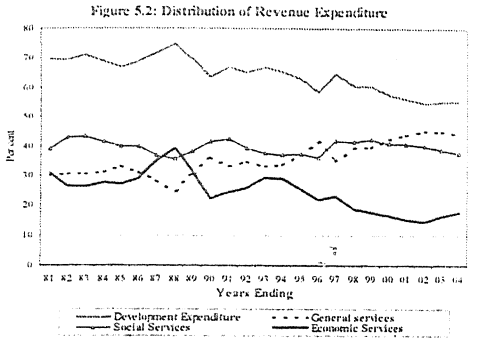


Figure 5.2: Distribution of Revenue Expenditure



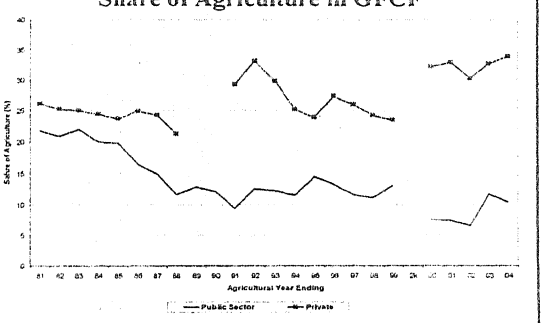
Structure of Capital Outlay

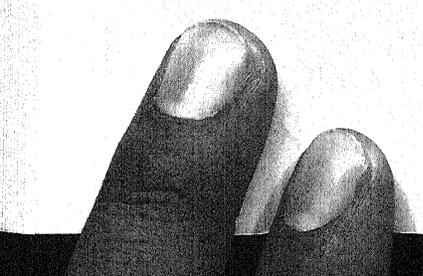
Financial Year	Capital Outlay as a ratio of GSDP (%)	Sectoral Share in Capital Outlay (Per cent)	
		Social Services	Economic Services
1980-81		20.9	77.2
1990-91		29.6	69.1
2000-01		42.8	55.7
2003-04		43.1	55.2

Structure of Revenue Expenditure (%)

Year Ending	1980-1	1990-1	2000-1	2003-4
Revenue Expenditure (Rs. Crore)	688	3480	15035	19370
General Services	30.1	33.1	43.9	44.5
Social Services	39.0	42.3	40.8	37.7
Education etc.	21.2	23.2	21.6	19.4
Medical, Health etc.	6.6	7.2	5.8	5.1
Water & Sanitation etc.	5.0	5.1	7.4	5.0
Social Welfare & Nutritn	3.1	4.8	5.0	7.0
Economic Services	30.9	24.6	15.4	17.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Share of Agriculture in GFCF





AGRICULTURAL PRICE POLICY IN THE WAKE OF ECONOMIC LIBERALISATION

By

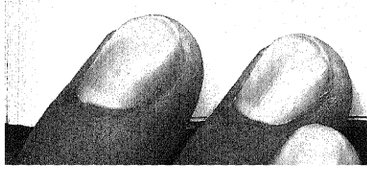
T. HAQUE

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



AGRICULTURAL PRICE POLICY IN THE WAKE OF ECONOMIC LIBERALISATION

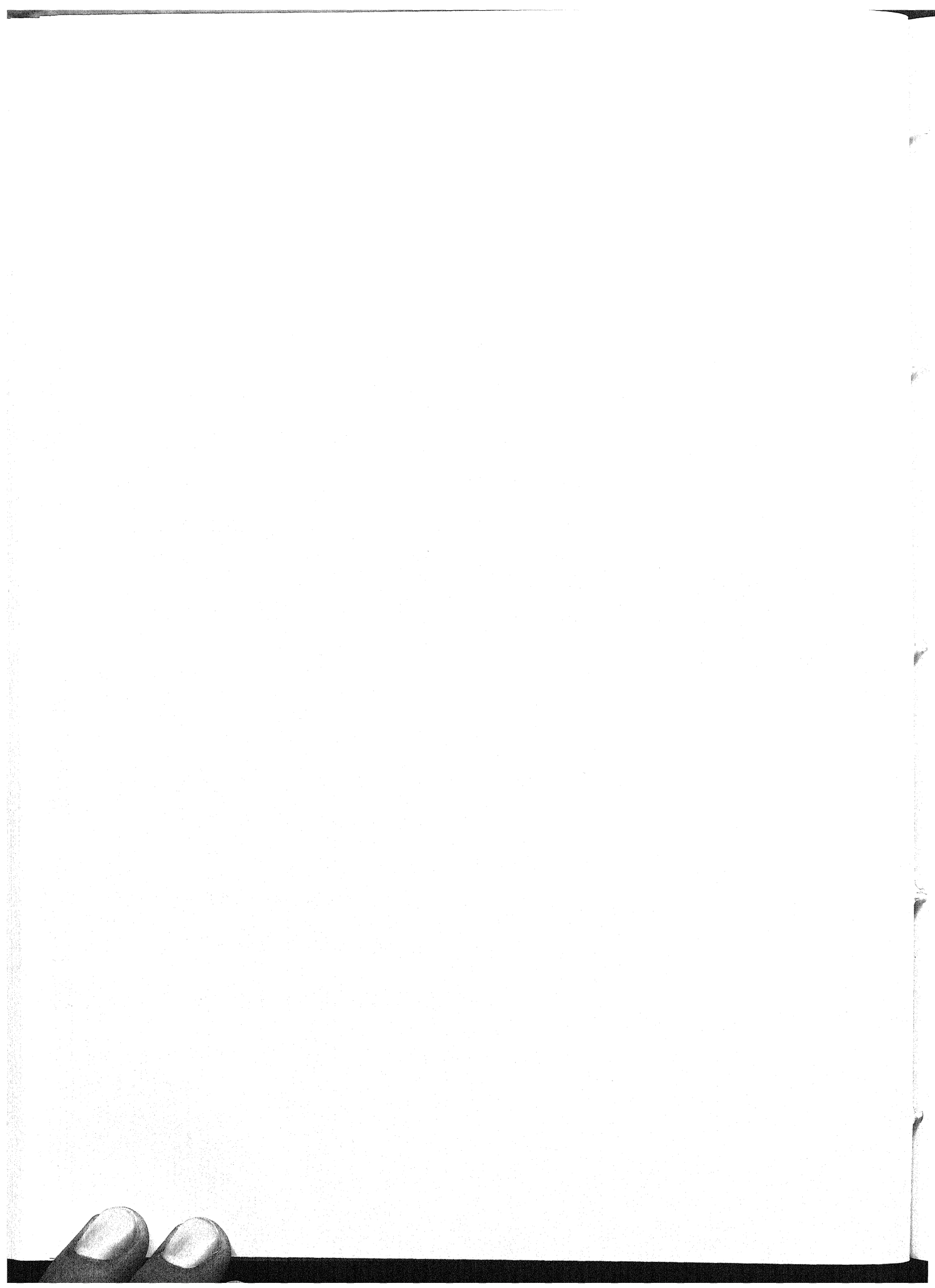
- T.Haque*

Agricultural Price Policy being followed in India from 1965 onwards, is generally known as the minimum support price policy. Currently, the Union government fixes minimum support prices of as many as 24 agricultural commodities, based on recommendations of the Commission for Agricultural Costs & Prices (CACP). The main objectives of the minimum support price policy are to provide incentive to the farmers for adopting improved technology and for developing a production pattern broadly in the light of national requirements and also to ensure rational utilization of land, water and other production resources.

It is now widely recognized that the minimum support price policy has been one of the key instruments, along with application of modern technology, to make the country self-sufficient in the production of foodgrains. However, currently in the wake of economic liberalization, there are some confusing perceptions about the relevance of minimum support price policy. The present paper is intended to discuss the role of agricultural price policy in the wake of economic liberalization and remove various

* Chairman, Commission for Agricultural Costs & Prices (CACP), Ministry of Agriculture, Govt. of India, Krishi Bhawan, New Delhi-110001.

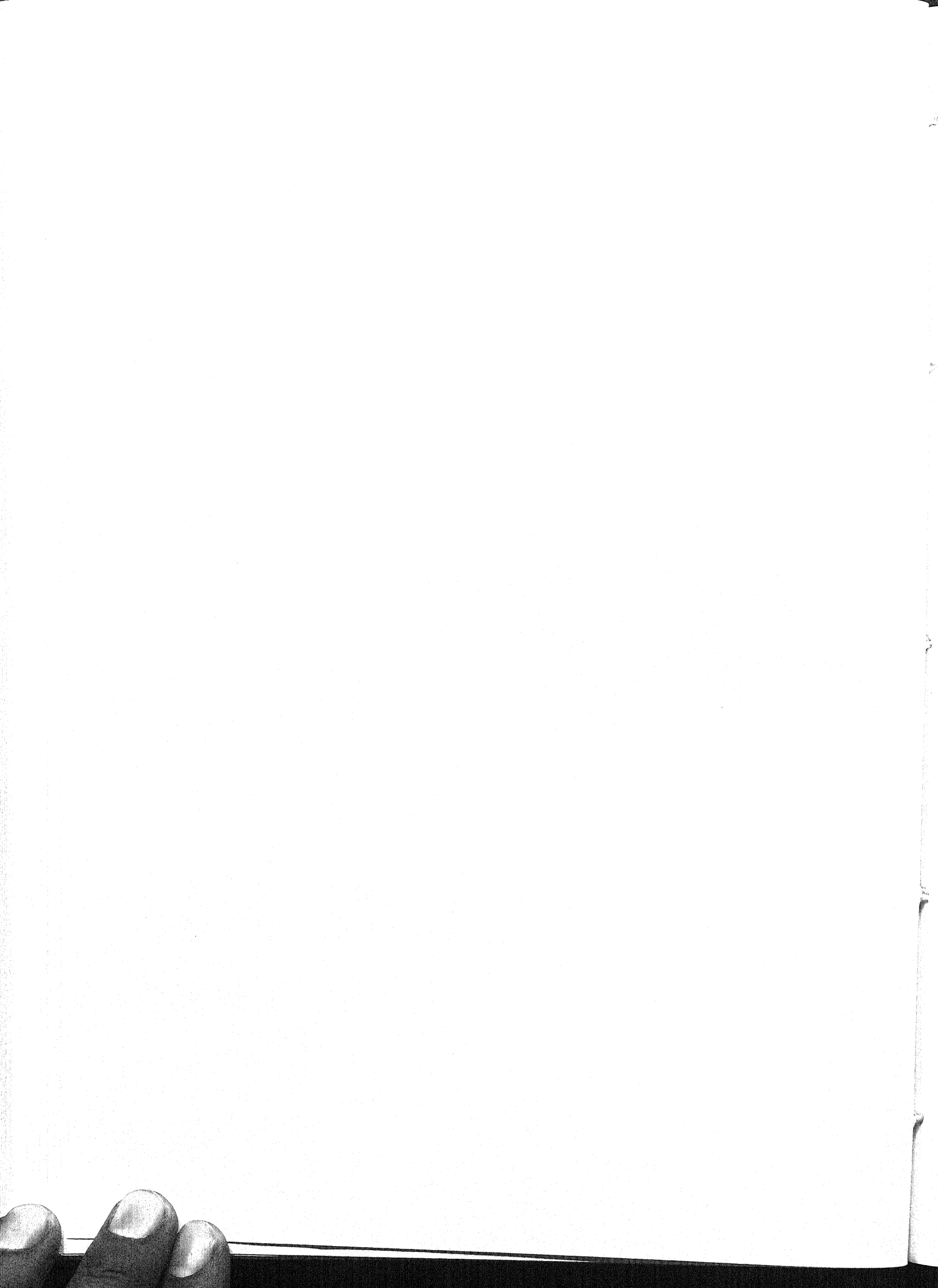
Note: The views expressed in the Paper are exclusively personal and do not necessarily reflect those of CACP.



confusions prevailing in academic, administrative as well as political circles. While the Common Minimum Programme of the government promises to ensure payment of remunerative prices to all farmers for all crops and in all regions, the Economic Survey of 2003-04 holds the system of open ended procurement at minimum support prices, responsible for high bill of food subsidies. Besides, several economists have recently pointed out that minimum support price policy tends to distort the open market prices and discourage the growth of private trade in foodgrains.

It should be recognized that the minimum support prices fixed by the government do not necessarily guarantee remunerative prices to all farmers for all crops and in all areas. In fact, farmers of several regions complain that existing MSPs do not cover their costs of production. It hardly requires to be mentioned that a farmer and for that matter any entrepreneur would have to earn some profit for future investment and growth for which there should be a remunerative price for his produce. If the market fails to ensure the remunerative price at any time, government should effectively intervene and provide such support, as buyer of the last resort. Unfortunately the minimum support prices are not always fixed at such incentive levels, even though protecting the interests of farmers and the farm economy remain upper most in the minds of the CACP and the government.

The factors which are considered in the determination of minimum support prices by CACP include (i) costs of production, (ii) changes in input prices, (iii) input-output price parity, (iv) inter-sectoral terms of trade, (v) trends in domestic as well as international market prices, (i) demand-supply situation, (vii) effect on industrial cost



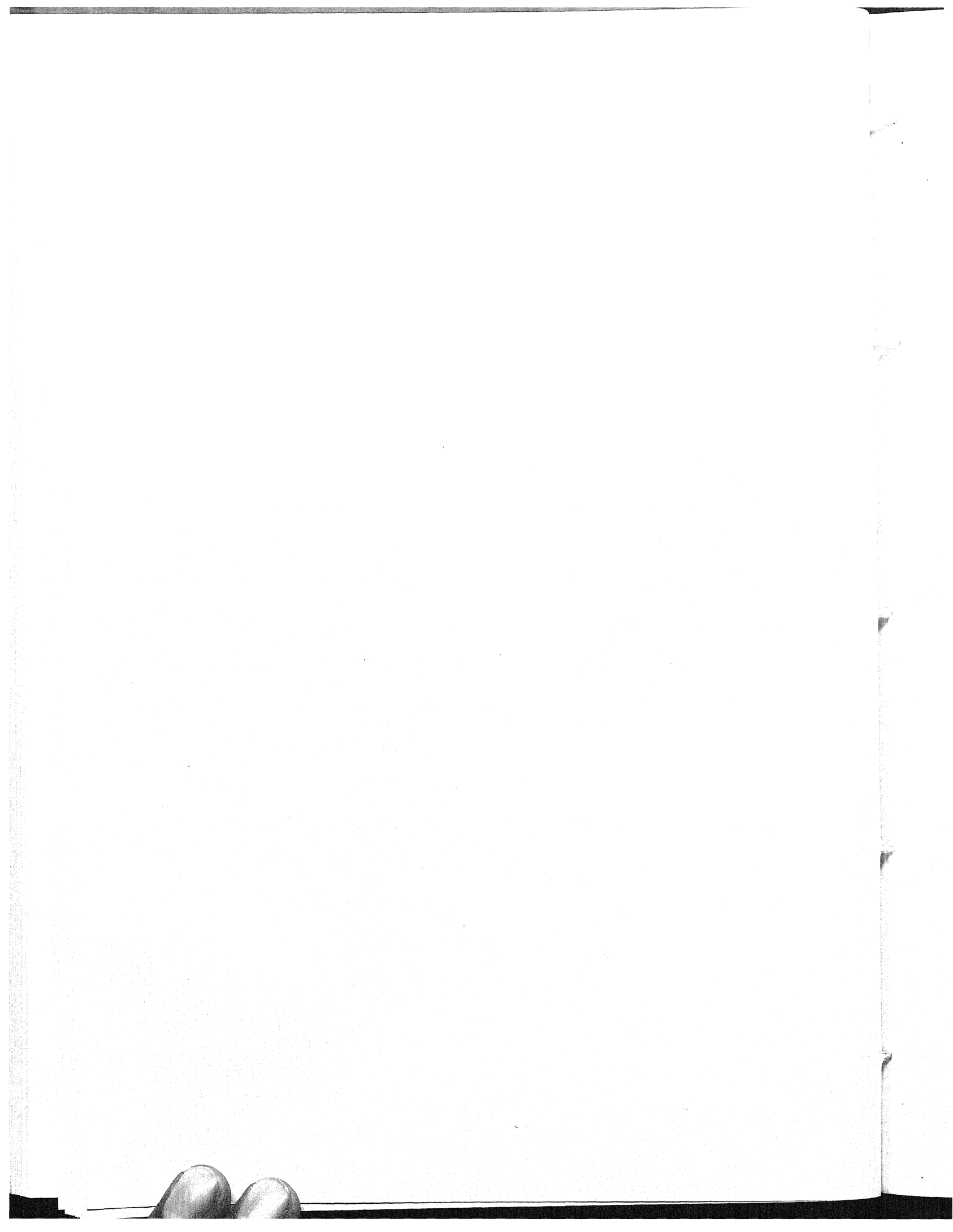
structure and general price level, (viii) rational utilization of land, water and other resources, (ix) inter-crop price parity and desirable cropping/production pattern and (x) effects of other policies on farm economy. The weights assigned to various factors vary from time to time, depending on the objective needs of the economy at any particular point of time. However, efforts are generally made to cover at least A_2+F_L cost (paid out expenses plus the imputed value of family labour) for those states where the costs of production are high and cover C_2 cost (including not only the paid out cost, but also the imputed value of family labour, rental value of land and interest on capital) for those states where the costs are relatively low. The idea is to encourage regionally differentiated production strategy based on cost-effectiveness. Nevertheless, the MSPs fixed may not cover any of these costs in some regions for some crops, as the costs of production vary widely from region to region and farm to farm, while the CACP considers all India weighted average costs. Unless the government fixes different MSPs for different regions and farmers, there is no way, the existing methodology can guarantee remunerative prices to all farmers in all regions. At the same time, it should be understood that fixation of different MSPs for different regions would not only stand in the way efficiency of agricultural production and market integration, but would also pose a problem of implementation.

As a matter of fact, farmers in most parts of the country are not so much unhappy with the level of minimum support prices, as with non-implementation of it. In several regions where costs of production are high, market prices rule generally below the MSPs, due to inadequate and ineffective procurement operations by implementing agencies such

as FCI, NAFED, CCI and JCI. Therefore, what is important is to ensure effective implementation of MSPs in all parts of the country and for all the crops for which MSPs are fixed. Equally important is to ensure the announcement of MSPs well before the sowing season of each crop, so that farmers could rightly allocate land and other resources among various crops.

MSP and Agricultural Diversification

It is often said that minimum support price policy has encouraged crops like wheat and rice only and therefore, stood in the way of much desired agricultural diversification. However, the truth is that minimum support price policy can influence agricultural diversification only to a limited extent, by changing the inter-crop price relationship. The role of non-price factors such as availability of appropriate high yielding, albeit cost effective technologies, effective marketing support and proper exim policy are probably more important. For example, if we feel that some area of rice and wheat should be diverted in favour pulses and oilseeds, because the country imports large quantities of pulses and edible oils, we need to provide higher relative prices for pulses and oilseeds, aside from improving their yields and imposing higher import duties. In the absence of a well coordinated policy support for technological change, effective implementation of MSP and rationalization of import duties, mere increase in the minimum support prices may prove to be counter productive. Similarly, diversification in favour of horticultural crops would require an integrated support system, involving technology, pricing, marketing, processing, export promotion etc.

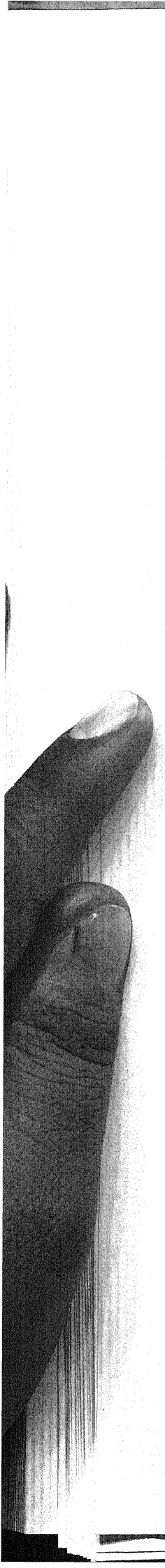


Should MSP be mechanically linked to either domestic or international prices ?

It is sometimes suggested that market prices which reflect the opportunity cost of a product should be one of the major criteria for fixing MSPs. But the question is whether we can allow MSPs to fluctuate like market prices without defeating the very purpose for which the system of MSP, was introduced. The fact is that international prices of most agricultural commodities are so volatile that linking MSPs with them could bring at times peril to the farmers. Besides, the world prices are influenced by huge subsidies given for both production and export of agricultural commodities in USA, EU and other advanced countries. Similarly, linking MSP with domestic prices which get influenced by international prices, could be disastrous for the farmers. At the same time, it is necessary to consider the trend in market prices particularly from the point of view of sustainability of proposed MSP in the market.

Relevance and sustainability of MSP in the wake of Economic Liberalisation

In recent years, the minimum support price policy of the government has been subjected to various criticisms. First of all it is said that the minimum support price policy was relevant only till the country was facing shortage of foodgrains and more so before the era of economic liberalization and globalisation began in the mid nineties with the advent of WTO. In the era of economic liberalization where there is emphasis on market led growth, the minimum support price policy based public procurement system distorts the market and tends to curb the growth of private trade Another criticism is that high MSPs of rice and wheat in the past have increased the food subsidy bill of the government which is not sustainable in the long run. Besides, the MSP policy is alleged



to have relatively favoured crops like paddy and wheat which have resulted in rapid depletion of ground water in many places. Lastly, the MSP policy is critised because at present it is effectively implemented only in states like Punjab and Haryana and to some extent in Andhra Pradesh, Uttar Pradesh, Madhya Pradesh and Rajasthan and thereby it promotes regional imbalances.

A close look at the last two criticisms of MSP would make it clear that these aim more at how the minimum support price policy is not properly implemented rather than at why the MSP should be discontinued. In fact, these criticisms strengthen the case for far more effective implementation of MSP for all crops and in all regions for balanced agricultural growth. Also the first point of criticism that India has achieved full measure of national food security and that the country does not have to encourage the production of foodgrains any more, through MSP looks quite erroneous. The annual growth rate of foodgrain production in the country averaged less than 1.0 per cent during the past one decade, while the population is growing at the rate of about 1.9 per cent per annum. As Mid Term Appraisal of the Tenth Five Year Plan rightly points out, per capita agricultural GDP has not shown any significant upward trend since 1996-97. In fact, stagnating crop yields at low levels, high input costs, low output prices in the market and frequent occurrence of natural calamities have forced the India farmers to be continuously in poverty trap. Therefore, accelerating the pace of diversified agricultural growth for poverty alleviation would certainly require an integrated support system, including infrastructure, technology and appropriate price policy. At present there is no viable alternative to MSP as the existing support system to agriculture in general is very



weak. Hence, any talk of doing away with MSP at this stage would be counter productive. Also the policy makers would have to keep in mind that there is a global move to make India gradually dependent on import of foodgrains and other agricultural commodities which may cripple the livelihood security of millions of farmers in the country. This is especially so when the advanced countries provide huge subsidies to their agriculture which has a depressing effect on market prices and farm business income. Besides, it should be noted that the rapid increase in food subsidy bill in recent years, is not so much due to high MSPs, but more because of rising costs of incidentals and food distribution. During 2002-03 to 2004-05, the per quintal cost of incidentals and distribution increased by about 17.4 per cent per annum for wheat and 9.0 per cent for paddy, while MSPs of wheat and paddy increased only by about 1.61 per cent and 1.87 per cent per annum respectively. Of course, there is scope for reducing the burden of food subsidy through improvement in managerial efficiency of FCI at various levels and by adopting a well designed decentralized procurement system. Finally, regarding the point that MSP discourages the growth of private trade and distorts market, the moot question is whether private trade can behave in a responsible manner in an imperfect market situation, without affecting the interests of producers and consumers adversely? Anyway, currently the government agencies procure only about 20 to 23 per cent of total production of wheat and paddy in the country. The large quantities of marketed surplus thus route through private channels. In areas, where state intervention is inadequate and ineffective, private traders always exploit the farmers by paying lower prices, while consumers do not gain to that extent. A close examination of the current situation would suggest that MSP system should function in such a manner that allows the growth of



private trade in agricultural marketing on competitive basis and also protects the interests of farmers as well as consumers.

Conclusions

To conclude, the minimum support price policy in conjunction with other supportive measures such as appropriate technology, infrastructure and forward looking exim policy can play an important role in accelerating the pace of diversified agricultural growth. While the free play of market forces, based on the laws of demand and supply may have to be encouraged in the long run, various imperfections in the present marketing structure would require adequate state intervention in the interest of both producers and consumers, at least in the short and medium terms. Also some unscrupulous traders can take the small, albeit unorganized farmers to ransom, if there is no price protection by the government. Given the country's poor administrative infrastructure and governance, check on malpractices by traders becomes all the more difficult. Therefore, the relevance of minimum support price policy remains, even though there is scope for improvement in its implementation. Besides, the minimum support price policy should have to address some of the new concerns arising from the need to enable the Indian farmers to participate and benefit from international trade in the wake of globalization. Ensuring cost effectiveness and international competitiveness of agricultural commodities would be crucial in this respect. Moreover, while determining the level of MSP, CACP has to consider the behaviour of other policy variables, such as monetary policy, fiscal policy, exim policy etc. which influence the effectiveness of minimum support prices, in promoting agricultural growth and farmers' welfare.

***



RIGIDITIES AND INEFFICIENCIES IN COMMODITY PRODUCTION: A CASE OF GORGON NUT (MAKHANA)

By

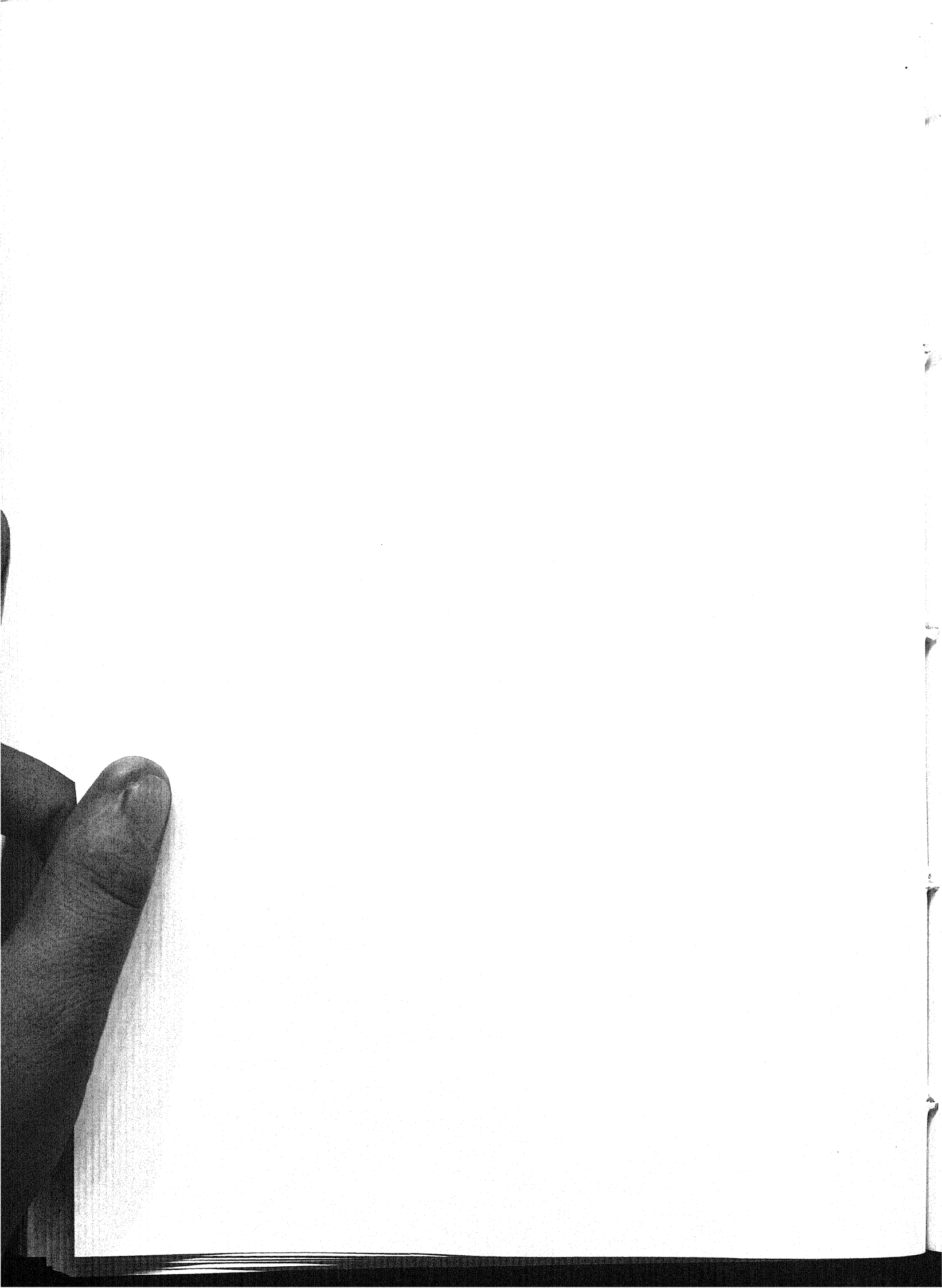
T.N. JHA

Paper presented at :

NATIONAL SEMINAR ON AGRICULTURAL GROWTH IN THE POST REFORM PERIOD : REGIONAL PERSPECTIVES

27-29 MARCH 2006

GIRI INSTITUTE OF DEVELOPMENT STUDIES
Sector O, Aliganj Extension Scheme
Lucknow 226 024



Rigidities and Inefficiencies in Commodity Production: a Case of Gorgon nut (Makhana)

Dr T N Jha*

(The Gorgon nut or what is known as makhana in vernacular language, given its high dietary and medicinal properties, has large domestic as well as export demand, mainly for its pure organic nature of farming. However, the cultivation of Makhana, which is dominant in Bihar, is replete with inefficiencies and rigidities in the factor market. Besides, it is characterised by complete absence of technological innovations and new agronomical practices. Intermediaries dominate both pond lease market and product market. The incidence of a large interlinked credit– product transactions with high element of exploitation cause large price spread and deprivations. High production and price fluctuations, given the absence of adequate demand absorption further cripple the commodity production.)

The commodity-based area planning approach has, of late, received the attention of the policy makers and planners in India. The rationale behind such policy approach is that it allows the region to enrich its commodity specific comparative advantages, promotes allocational as well as factor-use efficiencies, enhances factor productivity and, above all, increases profitability and returns on the investment. Such a development initiative becomes all the more important for under-developed regions in particular, as it generates more trickle down effect, creating increased income and employment opportunities for the general mass, and ensuring in the process social justice and distributional equity in development gains. Before such a plan is initiated in any region, it becomes imperative to understand the status and dynamics of production conditions of the commodity in question and draw appropriate policy conclusions. The present paper seeks to understand and analyze the production conditions of makhana commodity on the basis of data/information reflected by limited sample survey carried out in respect of Madhubani district of Bihar. Besides, introducing the makhana commodity and its medicinal and dietary properties, the paper discusses the level of makhana seed/guri and pop (processed seed) production; estimates current demand absorption of the product by segments; and analyzes production condition of makhana cultivation in terms of socio-economic settings of makhana cultivators and processors, inventory of water resources, including ownership and lease system of ponds; technological use and productivity levels, economics of

*The author acknowledges with deep appreciation the valuable comments/suggestions offered by Sh.K G Karmakar and Sh. Amaresh Kumar. Usual disclaimer applies.

makhana cultivation, price spread, inter-linked credit transactions, existing market channels, risk hazards, value additions, etc.

2. *Euryale ferox*, known in north India as Makhana and Gorgon nut or Foxnut in English belongs to the family of Nymphaeaceae. Reports of fossil species corroborate that *E ferox*[#] is a temperate plant, introduced through bird dispersal in different parts of the world, mainly India, China, Japan, Korea, North America, Manchuria, Nepal and Bangladesh. In India, Makhana is grown as a natural crop in stagnant water pool[♣] mostly lakes and tanks, in states such as Bihar, Assam, West Bengal, Tripura, Manipur, etc. The bowl shaped physiography of north Bihar, abounding in myriad stagnant fresh water pools with repositories of diverse acquaphytes holds unbound potential for cultivation of Makhana crop in this land. Possession of unique skill, unmatched elsewhere, by the fisherman community of this region in the arduous task of harvesting/collecting Makhana Guri seeds from the deep water beds by making heaps on the beds through countless dives and processing these seeds into kernels/ pops further endows the region in commercial cultivation and processing of this crop.

Dietary and Medicinal Properties of Makhana

3. The food material in Makhana seed is stored in the perisperm. The edible parts of the seed contain 12.8% moisture, 9.7% protein, 0.1% fat, 0.5% minerals, 76.9% carbohydrates and 1.4 mg/100g of carotene. Calorific analysis[α] gives a value of 362 k.cal/100g for raw Makhana and 328 k.cal/100g for popped Makhana. Thus, the calorific value of Makhana compares well with staple food materials such as wheat, rice, etc. Makhana is superior even to dry fruits such as almonds, walnut, coconut and cashew nut in terms of sugar, protein, and ascorbic acid and phenol content. It is even superior to many plant and animal-based diets. The medicinal properties of Makhana are also well established, but least explored. For example, its curative properties for human ailments such as respiratory, circulatory, digestive and reproductive systems are observed to be strong. It is also effective for stomatic and antichlor pain as also seminal loss. On account of lesser fat content, it serves as an ideal food for heart patients and invalids.

[#] Jha, V et el
[♣] Kargupta,AN & VN Jha
[α] Singh, JK

Production of Makhana – Guri and Pop

4. With an estimated area under Makhana cultivation at 12,864 ha. in the country, the Guri[#] seed production is estimated at 89,410 tones and that of pop[♠] production at 36,500 tones for 2002-03 as against 6,250 ha. makhana area, 50,000 tones of Guri production and 20,000 tones of Makhana pop production in 1990-91. The gross value of Makhana pop production works out to around Rs. 250 crore at farm gate prices and Rs 550 crore at retail prices for 2002-03 at the country level. The decadal growth in Guri and Makhana pop production comes to less than 10% for the country during the nineties. Significantly, Makhana (Guri and pop) production is concentrated in the north Bihar, particularly in the districts of Madhubani and Darbhanga With production of Makhana pop in respect of Bihar at 29,565 tones and 5,619 tones for Madhubani in 2002-03, their share in country's makhana pop production works out to 81% and 15% respectively. The growth in the production of Makhana for Bihar and Madhubani district has been stagnant in recent years. For example, production at 13,446 tones of Guri and 5,540 tones of pop in 2000-01, increased only marginally to 14,852 tones and 6,070 tones respectively in 2001-02 in Madhubani. Area under Makhana cultivation also remained by and large stagnant during these years. In fact, the production of Makhana guri seed is observed to have declined in 2002-03 by 8.2 per cent and 7.4 per cent respectively in Bihar and Madhubani respectively on account of flood and strong cold wave, which affected adversely the fruiting as well as harvesting of Makhana guris during the year.

Segments of Demand Absorptions

5. As the field investigations suggest, the current demand absorption of makhana pop is more in socio-religious segments as also sweetmeat and industrial use as starch. Its presence in the export market is virtually absent. Value-additions are also absent. However, going by the perceptions of the Makhana pop processors as also wholesalers, the potentials to enlarge its demand absorption in export as well as snacks fast food and pharmaceutical segments in the domestic market seems to be large. This is on account of the fact that Makhana is essentially an organic product with good dietary and medicinal properties to generate adequate export demand, particularly in the European

---

[#] Guri is the local name of makhana seed.

[♠] Pop is processed output of guri.

and American Continents. More important, the initial experience of pop processors at Patna in the form of snacks food product as well as pharmaceutical products viz., protein powder is quite encouraging. It is felt that even if it captures 10% of the existing snacks and protein powder market, it will absorb a large part of the Makhana pop production. It is estimated that in the ensuing years, the demand for Makhana pop would remain stagnant for socio-religious functions as also sweetmeat industry. But, it may witness 100-200% growth in the snacks food segment as also pharmaceutical, medicinal and export segments. Based on the growth perceptions thus obtained in different end use segments the demand for makhana pop in the country is projected to grow by 25% p.a. on an average in the ensuing years.

Production Conditions

6. As is reflected by the data/information obtained through sample survey of makhana growers as well as processors, NGOs and different State Government officials, the cultivation of makhana in Madhubani is replete with inefficiencies and rigidities in the factor market, including the water pond resources. It is characterized by absence of new technological packages, large presence of intermediaries in the makhana product market, presence of interlinked credit and product transactions with high element of exploitation, weak socio-institutional settings in which makhana growers and processors operate, absence of adequate demand absorptions, large price and production fluctuations, etc. In order to have a better glimpse of the production conditions of makhana commodity, the following paragraphs present additional analytical insights on the status of makhana cultivation.

i) Socio-Institutional Settings of Makhana Cultivators

7. The Makhana growers in Madhubani district are from Mallah/Machhuara caste with fishing and Makhana cultivation as their major economic activity. It is their traditional occupation, inherited from forefathers for generations. There are around 30 thousand households of Mallah with a population of nearly 2.0 lakh persons in the district. With most of them owning absolutely no land resource, they are highly resource as well as income poor segments of the society. With some exceptions of pond ownership, they cultivated makhana guri on leased government or private-owned ponds paying either fixed cash/kind rent or share in the produce with or without sharing in the input cost. Arrangements of guri processing into makhana pop involved mostly tagged transactions with

wholesale makhana traders at Madhubani providing the guri seed and getting back the processed pop in fixed ratios. The excess pop is retained by the processors and sold to the same trader at the tagged prices.

8. Average family size, ranging between 5-8 persons is high among makhana growers. The Mallah community is sub-divided into three sub-castes viz., Baanpar, Chaabh and Koal, each with straightjacket composition, not marrying among each other. Of them, Chaabh and Koal sub-caste groups have the dominant demographic presence (90%). They are the actual divers and guri harvesters. These fishermen move in groups to different places in Madhubani, Darbhanga, and Saharsa as also distant places in Assam, West Bengal and the neighbouring country of Nepal for harvesting Makhana seeds. The group generally harvests the seeds in 2-3 lots mostly on contract basis with fixed share in collected seeds or for cash amounts. They also possess the exclusive professional skill in Makhana pop processing.

9. Literacy level among Mallah, with knowledge of three R's (reading, writing and arithmetic) is abysmally low, more so among the females. With acute poverty, high incidence of malnutrition and under-nutrition is also witnessed, particularly among the children of this community. Division of labour is categorical among them, with men folk cultivating Makhana crop, which includes sowing (if required), transplanting and harvesting guris. The trading of Guris and Makhana pop is also handled by the male folk. These male-folk also engage in fishing work as wage labourers. The womenfolk, on the other hand, vend fish, look after domestic animals (cow, buffalo and goat), cultivate the field taken on lease, fry makhana seeds for popping (which is shared by men also), besides cooking the meals, looking after the house and family kids. Children too contribute, particularly in removing the hard kernels from Makhana pop. While the son would help in fishing and Makhana cultivation, the girl child does the household chores, including tending of little children. Child marriage is common in this community.

10. Thatched mud houses make up their dwelling units, which are generally clustered around the water-bodies. They sanctify water-bodies as their deity whom they worship and for whom they render sacrifices. A strong caste-panchayat operates amongst them whose decisions are binding on the fellow castemen. Apart from tobacco chewing and bidi smoking, another serious affliction in

their society is alcoholism among the men. This often leads to domestic violence and forces them into vicious cycle of crippling indebtedness. The menfolk borrow money from the traders, middlemen and moneylenders at high rates of interest (60% - 120% per annum) to fund their day-to-day expenses and drinking habits, which forces them fall into debt traps. Significantly, other castes have also moved into the business of Makhana cultivation and created their own niches in this market. They cultivate Makhana guri either on their own ponds or sub-leased government ponds by engaging the services of Mallah as wage earners.

ii) Inventory of Water Resources

11. Inventory of water pond resources suggests that the district is fairly rich in pond resources with a total of 5014 ponds and aggregate water area of 9673.2 ha. The average pond area works out to 1.93 ha. The Government ponds, with a share in the number of ponds and area at 60% and 62.2% respectively, had dominant presence in the district. Average pond area was higher for government ponds (2.01 ha). than private ponds (1.82 ha.). Makhana seed/guri is cultivated in only 41.5% of water pond/tank area in the district. Besides, the large low-lying (*chaur*) land (approximately 10 thousand ha.) also offers technical potential for Makhana guri cultivation in the district, as has been the experience in Purnea district.

12. Blocks having larger number of ponds (government as well as private) included Ghoghardiha, Laukahi, Harlakhi, Jhanjharpur, Madhbapur and Basopatti. However, in terms of water area, blocks such as Jhanjharpur, Basopatti, Harlakhi, Ladaniya and Madhepur figured more prominently in Makhana cultivation. Comparison of government ponds vis-à-vis private ponds across different blocks revealed that blocks such as Rajnagar, Madhawapur and Madhepur had larger number and area of private ponds. On the contrary, blocks such as Pandaul, Ladaniya, Babubarhi, Khajauli, Harlakhi, Basopatti, Jhanjharpur, Ghoghardiha, Andhra Tharhi and Laukahi had larger number and area of government ponds.

iii) Lease System of Government Ponds

13. Government ponds, earmarked for Makhana cultivation are leased out with preference to Fishermen Co-operative Societies, which, in turn, lease it to their members. These societies are registered under the Bihar Co-operative Societies Act, 1935. In select blocks, attempts have, of late,

been made to organize the Machhuara women into thrift and credit groups i.e. Self Help Groups. Some NGOs like SAKHI (Andhra Tharhi) have separately formed and promoted 'Fisherwomen Co-operatives', registered under the Bihar Self-Supporting Co-operative Societies Act, 1996. However, this trend is yet to catch up among the larger segments of Makhana growers in the district.

14. The Government ponds are leased to the Secretary of the Fishermen's Co-operative Society for one-year period only by the district administration at prescribed rates. The Secretary, in turn, sub-leases the pond to its members either individually or groups for one year at still higher rates. In some villages, it was seen that the entire Machchuara community in the village jointly cultivated Makhana ponds with equal sharing in the output as well as labour and other inputs. The field investigations also revealed that third-party lease of ponds by members of the Fishermen's Co-operative Society was common. Besides, the current lease arrangements of government ponds were revenue neutral and promoted large intermediations at the cost of depriving the real beneficiaries. It also promoted conflicts, often leading to violence and non-use of water resources. It also augmented lease cost of ponds, forcing Makhana growers to generate funds at higher rates of interest from informal money market, mostly the wholesale makhana traders at Madhubani. Instances of government ponds not being leased on account of being declared idle was also observed in certain cases. All these reflect the fact that the tank/pond resource, which is so crucial for cultivation of makhana is, in fact, inflicted with a number of institutional, legal, and structural rigidities, jeopardizing and hampering the cultivation of makhana guris in the district.

iv) Level of Technological Use

15. Cultivation of makhana guri was purely traditional with complete absence of modern agronomical practices. There was hardly any improved seed variety of makhana. The same seed, which was left in the pond or couldn't be harvested, germinates again in the next year, often with high density. The growers would re-plant them, if so required, in case the growth of makhana plant is sparse or dense. The application of chemical fertilizer was absent. Further, pests often affect the Makhana plant. Farmers were hardly using chemical pesticides and depended heavily on natural pesticides like application of ash, etc. In some cases, where the pond size was large, the farmers applied roping/netting techniques such that the pests/germs fall down to the ground from the Makhana leaves. With virtual absence of the use of chemical fertilizer and pesticides, Makhana

cultivation in the district was organic based. Harvesting of Guris was done manually often with high health hazards and risk to human life. In one village, a farmer narrated that while collecting guris from underneath water, once the fish entered the nose of a diver and he died instantly. The harvesting would be done using some tools made of bamboo sticks known as *gaaza*, which wouldn't last a single season with its intensive application. Again, processing of Guri into Makhana pop is done manually, mostly by the female folk, which is hazardous to health and involve high degree of drudgery, as they have to work constantly before fire. The process of hammering the heated Guri is also hazardous and at the same time it leads to wastage/loss of Makhana pop, as seeds, if fallen out of the flat wooden platform become thurri or low quality *lawa*/pop.

v) Productivity Levels

16. In the absence of new agronomical and technological practices, the productivity level of makhana seed/guri was very low in Madhubani district as compared to the technical potential. It was around 9.5 quintals/acre for guri in 2002-03 as against the expected technical potential of 15 qtls/acre. The productivity of guri in Madhubani was even lower than those (around 12.5 qtls/acre) in the districts of Kosi division of the state. Again, the productivity level of Makhana Guri was higher for larger size ponds. It was largely because the higher size pond owners invariably used and employed larger capital for traditional pest control measures as also for re-plantations, which, in turn, augmented yield level of guri production in such ponds. The case of makhana pop, however, didn't show any significant variations across different size categories of capital employed in the procurement of raw guris or makhana seed. This was largely because the processing of guri into makhana pop was invariably done through the same technology. However, the recovery rate of makhana from guris was significantly influenced by the quality of guri/seed and the skill of the processor. It was learnt in the field that smaller the seed variety better was the *lava/pop*. It was gathered that makhana guris, grown in Forbisganj areas of Araria district with smaller size yielded better recovery rate in respect of Makhana pop. However, the skill for processing Guris into Makhana pop is not commonly found everywhere. Even in Madhubani district, select few villages with dominance of Chabh and Koul sub-castes among *Mallaha* community specialized in processing of guris into best of makhana pop because of their traditional inheritance of the skill, mostly by the female folk.

vi) Economics of Makhana Cultivation

17. Summary of gross income, operating cost and net income for different size categories of Makhana pond growers are furnished below:

Economics of Makhana Cultivation (Guri and Pop Processing) by Size of Ponds

(Rs.)

Size of pond (Acre)	Gross income	Lease cost	Other operating cost	Net income	Total income/ acre	Net income/ member
A. Guri Cultivation						
1. 1.0 acre (own pond)	14,400	---	6,225	8,175	8,175	8,175
2. 1.0 acre (Govt. lease)	22,000	5,000	10,100	7,200	7,200	1,800
3. 1.0 acre (private lease)	22,620	4,000	12,840	8,780	8,780	2,195
4. 2.5 acre (P L Pond)	37,500	11,000	16,585	13,915	5,566	1,392
5. 10 acre (Govt. lease)	4,12,500	62,000	1,78,500	1,72,000	14,333	14,333
B. Guri Grower cum Processor						
2.0 acre (P L Pond)	74,090	9,500	41,240	23,350	11,625	11,625
C. Pop processing						
27 qtl. pop	87,555	---	59,510	28,045	---	28,045

18. Evidently, the net annual income from guri cultivation ranged from Rs.7,200 to Rs.14,333 per acre, depending upon the nature and size of the pond. The net income was higher for large pond growers and vice versa due to integrated fish Makhana culture as also scale and price advantage. The net income increased significantly as a result of value

addition due to processing of guri into Makhana pop. Lease cost of pond formed the major chunk of (30 – 40%) the total recurring cost, followed by expenses towards labour for guri harvesting and procurement (20-25%). Interest cost formed on an average 10% of total cost. Except one or two isolated cases, the application of chemical fertilizer/pesticide was almost absent. Income return ratio over cost ranged between 32-56% for Guri cultivation. Value addition due to pop processing ranged between 70 and 105 per cent of the base Guri production. Price loss due to tagged sale was around 10 per cent. Employment generation per quintal of Guri worked out to around 7 person days. The same increased to 17 person days in the event of pop processing.

vii. Price Spread

19. Prices of Guris as well as makhana pop varied widely across seasons as well as regional locations. For Guri, with 95% of arrival concentrating between August to October, its prices during peak season remained low in the range of Rs.13 – 15/kg. It reached almost Rs.20/kg by December. Mostly, the wholesalers in Madhubani hoarded it in their private godowns. Within the season, it varied, albeit marginally, across different locations/blocks in the district. It was relatively higher in such blocks where the concentration of Guri cultivation was higher, as the wholesalers had scale advantage and, therefore, offered to pay higher prices of guris in such blocks. Prices of guris also fluctuated widely across years, often influenced by the prices of Makhana pop which was by and large determined by the wholesalers in Kanpur, Delhi and Varanasi, as it was those traders who commanded and absorbed most of the demand for Makhana pop. During 2002-03, in the absence of adequate demand absorption by the local wholesalers, prices of guris remained depressed. Price of Makhana pop also showed seasonal fluctuations. At the farm level, it remained as low as Rs.55/kg reaching a level of Rs.110-120/kg. during the months of January–February. However, with most of the sale transactions by the grower being held during September – October, the average price of Makhana pops at farm gate, i.e. processors level was found to be Rs.65/kg only. At the wholesale level, the average price at Madhubani was in the range of Rs.110 – 120/kg. for

10kg. makhana gunny bag*. The wholesale price at Kanpur and New Delhi ranged at around Rs.130-140/kg for the same. It was still higher for 8 and 9kg. makhana bag due to better pop variety. It included transportation cost as also the commission and miscellaneous expenses. At the retail level, the price of makhana pop at different centers like Delhi, Mumbai, and Kolkata ranged between Rs.150 – 175/kg. With the emergence of a few makhana pop-processing units at Patna and Madhubani, the price of makhana pop at the farm level as also at the wholesale level has improved in recent years.

viii. Inter-linked Credit Transactions

20. Given the absence of investible surpluses, the Makhana growers and processors needed credit support at several stages. The first such need was at the time of taking the pond on lease. The second stage of availing credit was when the growers spent on pest treatment or dewatering or water filling of ponds. In some cases, they needed credit support even for harvesting purposes when the payment of wages was made in cash. As processing of Guri into Makhana pop is village specific, some persons take up Guri processing into makhana pop as a full time enterprise and acquire guris from distant places such as Purnea, Katihar, Assam and Nepal. They also hired skilled labourers on daily basis for the duration of makhana pop season. Such traders-cum- processors also needed large credit support for collection/procurement of Guris/Makhana seeds. However, the institutional credit support was by and large absent, except those given under SGSY scheme. As a result, the Makhana growers and processors had to depend heavily on the local moneylenders and wholesale traders in Madhubani for sourcing their fund needs. The wholesalers in Madhubani would also outsource such fund support from wholesale traders in Kanpur or Delhi. For such credit support, the wholesale traders at Madhubani charge an interest rate from the farmer/processors in the range of 3 – 5% p.m. while the traders at Kanpur and Delhi charge an interest rate of 1.5 – 2.0% p.m. from wholesale traders at Madhubani. In addition to paying high interest rates, the growers/processors are required to tag sale of their makhana guri or pop to such traders only at a price normally Rs.5 – 10/kg less than the prevailing market prices. More important, element of under-weightng at the hands of wholesale trader was also reported

* Full size gunny bag would accommodate 8-12 kg makhana pop depending upon its quality.

in the range of 10 –15%. Thus, due to interlinked credit/product transactions, the Makhana growers/processors were making explicit losses by 10 – 15% on underweighting and tagged sales. The exorbitant interest payment, ranging between 36 to 60% p.a. further robbed their due share.

ix. Existing Market Channels

21. It may be recalled, there are three distinct stages in Makhana cultivation and trade. In the first stage, Guri/ Makhana seed is cultivated by the growers in stagnant ponds/tanks and is sold to the wholesaler or the processors. The wholesaler, in turn, gets them processed into Makhana pop on contractual basis from some of the households from Machhuara community excelling in popping of Makhana. The contractual arrangement is that the wholesaler would give three quintals of guri/ makhana seed and the processor would give him back one quintal of Makhana pop. The processor as wages retains the excess of processed pop i.e. 9-12%. Thus, the wages for pop processing are in the range of 9 to 12 kgs. per quintal of processed Makhana. The processor would conditionally sell the popped Makhana to the wholesaler. In some cases, the wholesaler or the processor would obtain Makhana guris through local agents from distant places by paying a margin to them.

22. The Makhana pop is traded at different levels. Mostly, it is from Makhana processor to wholesaler under tagged arrangements. Sometimes, the processor would directly sell to retailers. However, this kind of trading is restricted to the local areas only. The five wholesalers in Madhubani purchase Makhana pop directly from the growers/processors. In some cases, they get it processed on contract basis from processors and hoard the pop in their personal godowns. They sell to wholesalers in Kanpur, Delhi, Varanasi, etc. as and when trading is agreed upon. The wholesale traders in Madhubani have also credit-cum-product inter-linkages in their transactions with wholesalers in Kanpur, Delhi, Varanasi, etc.

x. Storages/Godowns

23. Storages for two different products, viz., guri and Makhana pop, are required in makhana production. At the farmers' level, the guri is stored in an indigenous manner with construction of temporary structures in their homes. Such structures are temporary or pucca platform of required dimension with low bunding from different sides. They spray water regularly to avoid drying of guri seeds. This process continues till the guri is processed into makhana pop. In the case of wholesale traders, since they hoard larger quantity of guris, the size of their storage structure is larger; but they also follow the same technique of spraying water from time to time during the day to avoid drying of the Guri seed which will adversely affect the quality of makhana pop. In the absence of any systematic storage arrangement, which control temperatures and avoid labour cost, the farmers did express difficulties of storage and felt the need for some improved storage arrangements.

24. In the case of makhana pop, as it occupies more space, the processors simply store them in gunny bags and put them on some raised wooden platform in their own houses. As the makhana pop is completely dried, extreme temperature and humidity levels do not affect it. The farmers complained of common rat menace. At the wholesale level in Madhubani, the Makhana pop was stored in gunny bags, placed in large pucca storage houses owned privately by the wholesale trader.

xi. Transport Connectivity and Accessibility

25. From ponds to the farmhouse, small pond cultivators often transported guri manually. However, in the case of large pond cultivators, they used tractors - owned or hired. Small traders used bullock carts, tyre carts and horses for local transportation. The traders collecting guris from far-off places used small trucks, vans or rail links for transportation of guris from one place to another. The transport of Makhana pop from village to wholesale trader or from one wholesaler to another wholesaler in the town was mostly on tyre carts or tractors. Given the poor road conditions and village connectivity, it took almost the whole day for the grower/trader in distant villages to cover the distance of 15 – 20 kms. In the case of transportation from Madhubani to distant places, like

Kanpur and Delhi, it was mostly transported through railways where the charges were made on volume basis, which enhanced the transportation cost significantly. In the absence of direct broad gauge link from Madhubani to other destinations, it involved change of goods at Darbhanga, creating delays in delivery of goods. It was also transported through trucks to longer destinations, which involved higher transport cost.

xii. Risk Hazards

26. Makhana cultivation was exposed to several risk hazards. Production losses due to draught and flood were the most serious risk hazards. The flood sweeps away the standing makhana plants, adversely affecting guri output levels. Similarly, under drought conditions the makana plants dry down, which adversely affects the plant densities and fruit yields. In either situation, the production of guri was reported to decline anything upto 50-60 per cent. Intensity of price risk was still more serious. Seasonal price fluctuations, both for guri and pop, ranged between 80-90 per cent. Annual price fluctuations for Makhana (guri as well as pop) were equally large, ranging anything upto 75-80 per cent. For example, the short supply of guri due to large-scale damage of standing makhana plants in the pond caused steep price rise of both guris and makhana pop in 2001-02. In contrast, with normal production of guri during 2002-03, there was a glut situation, as the demand absorption of Makhana pop was quite low. Resultant impact of price fluctuation was the shrinkage in area under makhana guri cultivation in the district in the ensuing year.

xiii. Value Additions

27. Makhana pop is consumed mostly in raw pop form with different end uses. The secondary processing of Makhana pop into snacks food or any other product was almost absent, as only two small Makhana processing units at Madhubani were operating with small capacity. One of them has since been closed. The other one is operating at modest levels. With not even one per cent of Makhana pop being used for secondary processing into snack food, etc, value-addition through secondary processing in Makhana is almost negligible in the district.

Policy Suggestions

28. Any policy initiative, aimed at accelerating growth in makhana commodity production (guri and pop) and their increased demand absorption in the domestic as well as export market would warrant adoption of multi-pronged strategies. These would include, among others, overcoming rigidities and inefficiencies in the pond-lease market by amending existing lease system, promoting technological innovation and dissemination, and providing increased storage/godown facilities. The need to improve rail/road connectivity, including conversion of rail line in the select route as also providing freight incentives to such products and introducing weight-based freight charges, becomes all the more important for a more efficient transport network in the region. It also warrants narrowing of large price spreads and overcoming inter-linked credit and product transactions through the process of trade reforms and creation of required trade infrastructure. Further, the existing market channels need to be widened with a thrust to value additions and demand-led growth, particularly in the export segments. Risk hedging for both production and price fluctuations becomes all the more important in view of large risk exposure of the products. Such a policy thrust would augment farm income, generate increased employment opportunities, particularly for the deprived sections of the society and, above all, ensure better social justice.

@@@@@

References

1. Jha, V et el : 'Utilisation and Conservation of Euryale ferox, Salisbury in Mithila (North Bihar), India, Aquatic Botany: 39 (1991) 295-319 Elsevier Science Publishers B.V. Amsterdam.

2. Jha V. & GK Barat : "Nutritional Evaluation of Euryale Ferox Salisbury (Makhana)", Journal of Food Science and Technology, Vol. 28, September/October, 1991.

3. Haider, MG & R P Nath : "Chemical Control of Alternaria Leaf Blight of Makhana" Nat Accid Science Letters" Vol.10, No.9, 1987.

4. Kargupta, AN,et el & : "Makhana (Euryale ferox): an Aquatic Crop with high Potential". The Botanica

5. Verma, AN et el :"Integrated Culture of Air breathing Carnivorous Fishes with Makhana", Journal of Freshwater Bio, 8(2): 117-120, 1996

6. Sharma S B & PK Roy : "Makhana Cultivation in Bihar: A Status Report". Dept. of Horticulture, Tirhut College , Dhohi, Bihar.

7. Rajender B. & JN Roy : "Makhana: An Identy of Mithilanchal". Anuchintan. (1973-98), Sub-Divisional Office, Jhanjharpur.

8. Dutta, RN : "Plant Contents and Quality of Makhana". Plant Soil, 96: 429-432.

9. Singh, JK, : "Studies on Conservation and Management of Makhana" Ph.D. Thesis, L.N. Mithila University, Darbhanga.

@@@@@